ARCHIVES OF

OTOLARYNGOLOGY

EDITORIAL BOARD

GEORGE M. COATES, Chief Editor, Philadelphia

ISIDORE FRIESNER, New York
RALPH A. FENTON, Portland, Ore.
W. P. WHERRY, Omaha

CHEVALIER JACKSON, Philadelphia
JOHN F. BARNHILL, Miami Beach, Fla.
JAMES A. BABBITT, Philadelphia

VOLUME 30

1939

PUBLISHERS
AMERICAN MEDICAL ASSOCIATION
CHICAGO, ILL.

Medical
A.M.A.

CONTENTS OF VOLUME 30

JULY 1939. NUMBER 1

PAGE

Relation of Endocrine Dysfunction to Otolaryngology. Claude C. Cody Jr., M.D., Houston, Texas 1
Role of the Septum in Surgery of the Nasal Contour. Samuel Cohen, M.D., Philadelphia 12
Otitic Infections Due to the Pneumococcus Type III. J. L. Maybaum, M.D., and J. G. Druss, M.D., New York 21
Scleroma (Rhinoscleroma): Histologic Changes Following Teleradium Therapy: Review of Scleroma in the United States. J. Allan Weiss, M.D., Chicago 38
Labyrinthine Fistulas: Report of Experiments on the Vital Response to Various Methods of Producing Defects in Bone. Norton Canfield, M.D., New Haven, Conn 50
Osteoma of the Sinuses, the Frontal and the Sphenoid Bone: Report of Fifteen Cases. John H. Childrey, M.D., San Francisco 63
Mixed Tumors of the Salivary Gland Type Seen in the Pharynx. C. Calvin Fox, M.D., Philadelphia 73
Otolaryngologic Instruments. Joseph C. Beck, M.D., Chicago 86
Case Reports:
Pontile Abscess. Joseph B. Gaida, M.D., St. Cloud, Minn 93
New Instruments:
Instruments for Use in Laryngofissure. Mervin C. Myerson, M.D., New York 96
Progress in Otolaryngology. Summaries of the Bibliographic Material Available in the Field of Otolaryngology:
Plastic Surgery, 1938. Robert H. Ivy, M.D., D.D.S., and Henry A. Miller, M.D., D.D.S., Philadelphia 99
Abstracts from Current Literature 115
Society Transactions:
Montreal Medico-Chirurgical Society, Section of Otolaryngology 128
Chicago Laryngological and Otological Society 141
Book Reviews 154
Directory of Otolaryngologic Societies 155

AUGUST 1939. NUMBER 2

Neurologic Complications of Infections of Temporal Bone and Paranasal Sinuses: Summary of Twenty Years' (1919 to 1938) Experience (To Be Concluded). Joseph C. Yaskin, M.D., Philadelphia 157
Origin and Distribution of Air Cells in the Temporal Bone: Observations on Specimens from Twenty-Seven Infants and Sixty-Nine Human Fetuses. T. H. Bast, Ph.D., and H. B. Forester, Ph.D., Madison, Wis 183
Hypnosis: A Potent Therapy for Certain Disorders of Voice and Speech. John J. Levbarg, M.D., New York 206
The Eustachian Tube: Abnormal Patency and Normal Physiologic State. H. B. Perlman, M.D., Chicago 212
Rhinosporidiosis (Seeber): First Occurrence in a Female in North America. Jacob Ruchman, M.D., Brooklyn 239
Nasal Allergy in Children. E. J. Barnett, M.D., and H. D. Carnahan, M.D., Spokane, Wash. 247
Otitic Sinus Thrombosis Causing Intracranial Hypertension. W. James Gardner, M.D., Cleveland 253

AUGUST—*Continued*

PAGE

Acute Infection of the Circumvallate Papilla. Richard Waldapfel, M.D., Grand Junction, Colo. 269

Case Reports:

Bacillus Proteus in Otogenic Infections, Secondary Mastoiditis, Thrombosis of the Lateral Sinus and Bacteremia. Bennett G. Gerzog, M.D., Brooklyn 275

Sequestration of the Styloid Process Complicating a Parapharyngeal Abscess. Herman Rubin, M.D., and Samuel Galburt, M.D., Brooklyn 280

Clinical Notes:

A Practical Method for Posterior Polypectomy. E. R. Hargett, M.D., Springfield, Ohio 282

Progress in Otolaryngology. Summaries of the Bibliographic Material Available in the Field of Otolaryngology:

Tumors of the Nose and Throat. Gordon B. New, M.D., Rochester, Minn.; Walter Kirch, M.D., Des Moines, Iowa, and John B. Erich, M.D., Rochester, Minn. 283

News and Comment 298

Abstracts from Current Literature 299

Society Transactions:

Chicago Laryngological and Otological Society 307

Book Reviews 316

Directory of Otolaryngologic Societies 317

SEPTEMBER 1939. NUMBER 3

Atrophic Rhinitis: Treatment with Estrogenic Substances, with Biopsy Before and After Treatment. Watt W. Eagle, M.D.; Roger D. Baker, M.D., and E. C. Hamblen, M.D., Durham, N. C. 319

Nasograph Mirror of Glatzel as a Measure of Nasal Patency. Charles C. Lieb, M.D., and Michael G. Mulinos, M.D., New York 334

Motion Pictures of the Human Larynx. William A. Lell, M.D., with the Assistance of William J. Sullivan, Philadelphia 344

Congenital Tracheoesophageal Fistula Without Atresia of the Esophagus: Report of a Case with Plastic Closure and Cure. Charles J. Imperatori, M.D., New York 352

Neurologic Complications of Infections of Temporal Bone and Paranasal Sinuses: Summary of Twenty Years' (1919 to 1938) Experience (Concluded). Joseph C. Yaskin, M.D., Philadelphia 360

The Larynx in Infantile Beriberi. Vivencio C. Alcantara, M.D., and Geminiano deOcampo, M.D., Manila, Philippine Islands 389

Oroantral Openings and Their Surgical Correction. Adolph Berger, D.D.S., New York 400

Constitutional Background of Infection of the Upper Part of the Respiratory Tract. John B. Price, M.D., Norristown, Pa. 411

The Larynx of the Tuberculous Child. Herman Rubin, M.D., and Samuel Galburt, M.D., Brooklyn 421

Case Reports:

Recovery from Thrombosis of the Cavernous Sinus. Ernest M. Seydell, M.D., Wichita, Kan. 429

Treatment of Meningitis Due to Pneumococcus Type III with Sulfanilamide; Recovery. Daniel Silverman, M.D., and Melvin Thorner, M.D., M.Sc., Philadelphia 431

New Instruments:

Simplified Apparatus for Laryngeal Cinematography. Adrian Solo, M.D., Somerville, Mass., and Nathan L. Fineberg, M.D., and George Levene, M.D., Boston 437

A Microapplicator for Use in Otologic Work. G. R. Lacy, M.D., and F. A. Lanson, M.D., Pittsburgh 440

SEPTEMBER—*Continued*

PAGE

Progress in Otolaryngology. Summaries of the Bibliographic Material Available in the Field of Otolaryngology:
The Paranasal Sinuses (To Be Concluded). Samuel Salinger, M.D., Chicago 442
News and Comment 480
Abstracts from Current Literature 481
Society Transactions:
Chicago Laryngological and Otological Society 490
Book Reviews 494
Directory of Otolaryngologic Societies 495

OCTOBER 1939. NUMBER 4

Surgical Treatment of Deafness. Walter Hughson, M.D., Abington, Pa 497
Further Experiments in the Action of Drugs on the Nasal Mucosa. Arthur W. Proetz, M.D., St. Louis 509
Blood Cultures in Cases of Otitic Sepsis. Joseph L. Goldman, M.D., New York 516
Hay Fever Among Japanese: III. Studies of Atmospheric Pollen in Tokyo and in Kobe. H. J. Hara, M.D., Ph.D., D.Sc. (Med.), Los Angeles 525
Vertigo: Clinical Consideration. Benjamin H. Shuster, M.D., Philadelphia .. 536
Climatic Factor in Mastoiditis. Noah D. Fabricant, M.D., Chicago 549
Experiences with Sulfanilamide Therapy for Otogenous Infections, with Special Reference to Masking of the Clinical Course. Jacob L. Maybaum, M.D.; Eugene R. Snyder, M.D., and Lester L. Coleman, M.D., New York 557
Origin of the Quick Component of Larbyrinthine Nystagmus. E. A. Spiegel, M.D., Philadelphia, and J. B. Price, M.D., Norristown, Pa 576
Headache from Pathologic Changes in the Nose or Other Causes: Differential Diagnosis. T. Roy Gittins, M.D., Sioux City, Iowa 589
Importance of Vestibular Findings Following Injury to the Head. Myron A. Zacks, M.D., Philadelphia 601
Carcinoma of the Trachea. Arthur M. Olsen, M.D., Rochester, Minn 615
Case Reports:
Cervical Abscess Resulting from Unusual Foreign Body in the Pharynx. Lewis E. Etter, M.D., Warrendale, Pa 631
Progress in Otolaryngology. Summaries of the Bibliographic Material Available in the Field of Otolaryngology:
The Paranasal Sinuses: Malignant Tumors (Concluded). Samuel Salinger, M.D., Chicago 633
Abstracts from Current Literature 676
News and Comment 684
Society Transactions:
American Laryngological, Rhinological and Otological Society 685
Directory of Otolaryngologic Societies 687

NOVEMBER 1939. NUMBER 5

Experiences with Fistulization of the Labyrinth in Chronic Progressive Deafness: Report of Cases. Edward H. Campbell, M.D., Philadelphia 689
End Results of Intranasal Operation for Maxillary Sinusitis. Bert E. Hempstead, M.D., Rochester, Minn 711
End Results of Intranasal Operations on the Ethmoid, Frontal and Sphenoid Sinuses. E. R. Faulkner, M.D., New York 716
End Results of External Operations on the Maxillary Sinus. Samuel Salinger, M.D., Chicago 721
End Results of External Operations on the Frontal, Ethmoid and Sphenoid Sinuses. M. F. Arbuckle, M.D., St. Louis 736
Atresia of the External Auditory Meatus: Canalization by Electrocoagulation. Joel N. Novick, M.D., M.Sc. (Med.), Washington, D. C 744
Short Wave Diathermy in Treatment of Nasal Sinusitis. A. R. Hollender, M.D., Miami Beach, Fla 749

NOVEMBER—*Continued*

PAGE

Treatment of Acute Suppurative Otitis Media: Does Douching of the Ear Spread Infection to the Mastoid Cells? Otto C. Hirst, M.D., Philadelphia 755
Benign Cysts and Adamantinomas of the Jaws. Fred Z. Havens, M.D., Rochester, Minn. 762
"Functional" Loss of Hearing Following Injuries to the Head: Preliminary Report. Morris Rosenthal, M.D., New York 775
Case Reports:
Deforming and Recurring Polyps of Youth. Herman I. Laff, M.D., Denver 795
Progress in Otolaryngology. Summaries of the Bibliographic Material Available in the Field of Otolaryngology:
Purulent Otitis Media, Mastoiditis, Sinus Thrombosis and Suppuration of the Petrous Pyramid. Samuel J. Kopetzky, M.D., New York 800
News and Comment 830
Abstracts from Current Literature 831
Society Transactions:
American Laryngological Association 839
Directory of Otolaryngologic Societies 861

DECEMBER 1939. NUMBER 6

Tonsillectomy: Local Results and Influence of the Operation on Surrounding Tissues. Edward H. Campbell, M.D., Philadelphia 863
Nursing, Feeding and Parenteral Administration of Fluids. W. E. Grove, M.D., Milwaukee 872
Transfusions of Blood in the Care of Patients After Operations for Otitic Sepsis. J. Marion Sutherland, M.D., Detroit 876
Chemotherapy. Thomas C. Galloway, M.D., Evanston, Ill 901
A Simple Quantitative Method of Testing Vestibular Function. Miles Atkinson, M.D., F.R.C.S. (Eng.), New York 916
Structure of the Petrous Portion of the Temporal Bone, with Special Reference to the Tissues in the Fissular Region. Barry J. Anson, Ph.D. (Med. Sc.), and J. Gordon Wilson, M.D., Chicago 922
Congenital Cysts of the Larynx: Report of a Case. Gordon B. New, M.D., and John B. Erich, M.D., Rochester, Minn. 943
Treatment of Otitic Meningitis. Daniel S. Cunning, M.D., New York 950
Intranasal Dacryocystotomy. W. E. Sauer, M.D., St. Louis 973
Case Reports:
Papillary Tumors of the Tonsil. J. Julian Chisolm, M.D., Baltimore 986
Meningococcic Coryza. L. Dell Henry, M.D., and Hugh A. Kuhn, M.D., Hammond, Ind. 991
Clinical Notes; New Instruments and Technics:
Mastoid Retractor, Self Retaining, for the Endaural, Antauricular Technic. Benjamin H. Shuster, M.D., Philadelphia 993
Catheterizing the Sphenoid. Fred W. Dixon, M.D., Cleveland 994
Otoscopic Attachment. W. M. Fitzhugh Jr., M.D., and C. E. Hass, M.D., San Francisco 997
Progress in Otolaryngology. Summaries of the Bibliographic Material Available in the Field of Otolaryngology:
Chronic Progressive Deafness, Including Otosclerosis and Diseases of the Inner Ear. George E. Shambaugh Jr., M.D., Chicago 999
News and Comment 1037
Abstracts from Current Literature 1038
Society Transactions:
Montreal Medico-Chirurgical Society, Section of Otolaryngology 1051
Book Reviews 1061
Directory of Otolaryngologic Societies 1063
General Index 1065

ARCHIVES OF OTOLARYNGOLOGY

VOLUME 30 JULY 1939 NUMBER 1

COPYRIGHT, 1939, BY THE AMERICAN MEDICAL ASSOCIATION

RELATION OF ENDOCRINE DYSFUNCTION TO OTOLARYNGOLOGY

CLAUDE C. CODY JR., M.D.

HOUSTON, TEXAS

A dual relation exists between endocrine dysfunction [1] and otolaryngeal disease. First, infections of the throat and nose have an effect in producing endocrine disorders, and, second, an endocrine defect is an etiologic factor in diseases of the ear, nose and throat. The effects of systemic and focal infections on the pituitary [2] and the thyroid gland,[3] particularly, have been studied from both the histologic and the physiologic standpoint. Bacteria and inflammatory reactions have been demonstrated in each of these organs. Such investigations [4] show that an infection occasionally stimulates initially an increase in the activity of the affected ductless gland, which is followed by a lessening of secretion or exhaustion of the hormone. There is no difference between a systemic and a focal infection [5] as a cause of endocrinopathy. Also, the commoner infections are more frequently reported as etiologic factors. An infection of the tonsils, adenoids or paranasal sinuses occasionally

---

Read in part at a meeting of the southern section of the American Laryngological, Rhinological and Otological Society, Memphis, Tenn., Jan. 13, 1937.

1. Acknowledgement is made of the free use of the following: Glandular Physiology and Therapy: A Symposium Prepared Under the Auspices of the Council on Pharmacy and Chemistry, Chicago, American Medical Association, 1935. Zondek, H.: The Diseases of the Endocrine Glands, Baltimore, William Wood & Company, 1935.

2. (*a*) Houssay, B. A.: Hypophysis and Resistance to Intoxications, Infections and Tumors, New England J. Med. **214**:1137-1146 (June 4) 1936. (*b*) Cushing, H.: The Pituitary Body and Its Disorders, Philadelphia, J. B. Lippincott Company, 1912, p. 236. (*c*) Pickworth, F. A.: Perforation of the Pituitary Fossa by a Septic Lesion of the Sphenoidal Sinus Associated with Recent Epilepsy and Insanity, J. Laryng. & Otol. **43**:186-190 (March) 1928.

3. Rosenow, E. C.: The Newer Bacteriology of Various Infections as Determined by Special Methods, J. A. M. A. **63**:903-908 (Sept. 12) 1914. Cole, W. H., and Womack, N. A.: The Thyroid Gland in Infections: Preliminary Report, ibid. **90**:1274-1276 (April 21) 1928.

4. Houssay,[2a] p. 1138.

5. Sloan, E. P.: The Thyroid, Springfield, Ill., Charles C. Thomas, Publisher, 1936, p. 46.

results in an imbalance of the hormones of the affected ductless glands, with consequent development of endocrinism. It is not known whether this phenomenon is due to the action of a specific strain of bacteria, to glandular selectivity for a bacterial toxin or to an inherent tendency to an endocrine disorder. But in any event it is established that early removal of foci of infection, especially in children, frequently lessens and sometimes cures the endocrine defect. However, the elimination of an incidental focus of infection has no effect on congenital endocrinopathy.

ENDOCRINE ORGANS

The endocrine glands of clinical importance are the pituitary, the thyroid, the adrenals, the pancreas, the gonads, the parathyroids and the thymus. Each of these secretes one or more hormones, which may affect other organs, metabolism or one another. The hormones have either a stimulating or an inhibitory effect. Their therapeutic action may be either physiologic or pharmacologic. A brief résumé of some of the more important physiologic functions follows.

The pituitary is the master gland which stimulates or controls the others. The posterior lobe secretes two hormones, pitressin and pitocin. Pitressin influences circulation of blood, respiration and carbohydrate metabolism; it also acts on the kidneys and the intestines. Pitocin has an oxytocic effect. The anterior lobe secretes five hormones and probably more. These are: the somatotropic, or growth, hormone; the thyrotropic, or thyroid-stimulating, hormone; the adrenotropic hormone, which stimulates the adrenal medulla and cortex; the gonadotropic, or gonad-stimulating, hormone; the mammotropic, or lactogenic, hormone, and probably hormones affecting the metabolism of carbohydrates, fats and proteins. The presence of the first five of these hormones has been conclusively established, but they have not been isolated in sufficient purity to be accepted by the Council on Pharmacy and Chemistry of the American Medical Association for inclusion in New and Nonofficial Remedies.

Thyroxine is the hormone of the thyroid. Its main function is to stimulate the oxidative processes and to affect growth through the specific secretion of iodine. The hormone of the medullary portion of the adrenal is epinephrine. The secretion of epinephrine is not necessary for life or health. Its physiologic function, except for the interrelation between the adrenal and other endocrine glands, is obscure. Its value in therapy is due to its pharmacologic action. The hormone of the adrenal cortex has not been isolated. Recent investigation of its function suggests that it is concerned with the regulation of the metabolism of sodium, potassium and carbohydrates. The known hormone of the pancreas is insulin. The characteristic reaction is to lower the percentage

of blood sugar and facilitate its storage as glycogen in the liver and muscles. The ovary secretes an estrogenic hormone, affecting the menstrual cycle. Progestin is the hormone of the corpus luteum necessary for pregnancy. The testis produces androgens. The status of the physiologic action of androgen is at present uncertain. The hormones of the parathyroid and thymus will be discussed later.

RELATION OF FOCAL INFECTION AND ENDOCRINE DYSFUNCTION

Acute tonsillitis [5] occasionally affects the thyroid. On subsidence of the infection the size and function of the thyroid usually return to normal. A metastatic infection of the gland may develop into acute thyroiditis, with eventual hyperplasia and hyperplastic or exophthalmic goiter. Later in the areas affected sclerosis may occur, followed by symptoms of hypothyroidism. Chronic tonsillitis [6] sometimes causes dysfunction of the thyroid. Focal infection may stimulate the activity of the gland, with the result of slight hyperthyroidism, and later, with depression of secretion, mild hypothyroidism appears. Watkins [7] reported a much higher percentage of chronic tonsillitis in patients with mild hypothyroidism than in a series of unselected patients. Tonsillectomy improves either hyperthyroidism or hypothyroidism in some of the patients. It seems probable that in those patients who are benefited by removal of the tonsils the dysfunction is to be ascribed to the action of bacterial toxins and not to organic changes in the gland. Tonsillectomy is of no value for sclerotic, colloid or exophthalmic goiter.

It is established that infection depresses the action of insulin. Joslin expressed the opinion that infections are not of great etiologic importance in diabetes mellitus. On the other hand, Barach [8] presented evidence that chronic tonsillitis has a causal relation to diabetes. Lierle and Potter [9] reported that diabetes in children is frequently recognized first during acute tonsillitis. They found chronic sinusitis and chronic tonsillitis occurring commonly in diabetic children. There is unanimity of opinion that elimination of foci of infection either by tonsillectomy or by definitive treatment of nasal sinusitis improves the health of diabetic patients and raises their tolerance for carbohydrates.

---

6. Billings, F.: Focal Infection: Its Broader Application in the Etiology of General Disease, J. A. M. A. **63**:899-903 (Sept. 12) 1914.

7. Watkins, R. M.: Mild Hypothyroidism, Ann. Int. Med. **7**:1535-1539 (June) 1934.

8. Barach, J. H.: Etiologic Factors in Diabetes, Arch. Int. Med. **39**:636-642 (May) 1927.

9. Lierle, D. M., and Potter, J. J.: The Role of Chronic and Subacute Infections in Diabetic Children, Arch. Otolaryng. **14**:432-439 (Oct.) 1931.

Linder, Harris and Fraser [10] reported that 2 patients after thyroidectomy had tetany as a sequel to damage of the parathyroids. The tetany and laryngismus became much worse during an attack of acute tonsillitis but improved with recovery from the infection. One of these patients had dyspnea and cyanosis sufficient to require a tracheotomy. One had complete disappearance of the laryngismus and tetany after tonsillectomy. In the other the improvement following the removal of the tonsils was great enough to allow the dose of solution of parathyroid to be reduced to 20 units daily.

The appearance of a child with hypertrophied tonsils and adenoids is familiar. The open mouth, the slightly thickened lips, the retroussé nose, the prominent nostrils, the face apparently broadened and flattened, the listless attitude and the rather dull appearance constitute a common observation. It is a universal experience that tonsillectomy and adenoidectomy improve the facial expression and frequently the mentality and increase the weight and height in nearly all these children. A hormone in the tonsils and adenoids has not been demonstrated. It seems probable that the rapid and striking changes in the mentality, soft parts and osseous structure of these children may be due to the action of a tonsillar and adenoidal bacterial toxin on the pituitary and thyroid. There is a close similarity between the facies accompanying hypertrophy of the tonsils and adenoids and that caused by an endocrine dysfunction classified by Engelbach [11] as a thyropituitary disorder (fig.). Moreover, many children with chronic tonsillitis do not present the picture described.

It is established that an imbalance of thyroid or pituitary function affects the growth, appearance and mentality of laboratory animals or persons, particularly if it occurs during the period of growth. The facies characterizing hypertrophy of the tonsils and adenoids in children may well be evidence of dysfunction of the pituitary and probably of the thyroid. Citelli [12] recently confirmed his previous observations that adenoids may cause a pituitary disorder. The exceptional child with a normal nose who continues to breathe through the mouth after tonsillectomy and adenoidectomy is entitled to a basal metabolism test. Removal of the tonsils and adenoids is of no benefit for congenital thyropituitary defect.

---

10. Linder, G. C.; Harris, C. F., and Fraser, F. R.: The Elimination of Focal Sepsis in the Treatment of Parathyroid Tetany, Quart. J. Med. **24**:469-479 (July) 1931.

11. Engelbach, W.: Endocrine Medicine, Springfield, Ill., Charles C. Thomas, Publisher, 1932, vol. 2, pp. 102-118.

12. Citelli, S., cited in Adenoids and the Sex Glands, Foreign Letters (Italy), J. A. M. A. **102**:226 (Jan. 20) 1934.

Shea [13] showed that neglected sinusitis in childhood interferes with the development of the nasal sinuses. He stressed the importance of definitive treatment of acute and particularly of chronic sinusitis in children as a prophylaxis for such maldevelopment. Mortimer [14] demonstrated that the effects of a pituitary defect on the paranasal sinuses are so characteristic that the dysfunction can be diagnosed from the roentgenogram. Sinusitis affects the growth of the paranasal sinuses in many children, but in some it does not. From this it seems that infection is not the sole factor in maldevelopment. The process may well be that sinusitis sometimes causes pituitary dysfunction sufficient to affect the growth of the paranasal sinuses. The great value of Shea's observa-

Photograph of a patient with a thyropituitary disorder, showing the striking resemblance to the facies of a child with hypertrophied tonsils and adenoids (from Engelbach,[11] by permission of the publisher).

tions is in showing the importance of effective treatment of sinusitis in children; that of Mortimer's is in proving the relation between dysfunction of the hypophysis and infection of the paranasal sinuses.

EFFECT OF ENDOCRINE DYSFUNCTION ON THE EAR, NOSE AND THROAT

Headache is so often the presenting symptom of sinusitis that it has almost become otolaryngologic. Also, it is one of the most frequent

13. Shea, J. J.: Morphologic Characteristics of the Sinuses, Arch. Otolaryng. **23**:484-487 (Sept.) 1936.

14. Mortimer, H.: Hormone Factor in Evolution, Development and Growth of Paranasal Sinuses, Tr. Sect. Laryng., Otol. & Rhin., A. M. A., 1935, pp. 50-54.

symptoms of endocrinopathy. In general, a headache from a disorder of the endocrine organs, while it may be limited to one side, is not so definitely or precisely localized as that from sinusitis. However, administration of thyroid extract in excessive amounts to a patient with hypothyroidism may produce a frontal headache so closely simulating that from frontal sinusitis that they can be differentiated only by stopping the medicine. This phenomenon has been not infrequently observed in children and in adults.

Furunculosis of the external auditory canal is occasionally seen in myxedema. It improves rapidly with administration of thyroid in appropriate doses. Recurrent furunculosis of the external auditory canal is an indication for either a basal metabolism test or an estimation of the blood sugar.

The nasal septum has no characteristic change in color in either hyperthyroidism or hypothyroidism. It is pink in many hyperthyroid and pale in many hypothyroid patients, but the exceptions to this rule are so frequent that the color is valueless for differential diagnosis. In advanced myxedema, however, the mucosa is pale and the inferior turbinates hypertrophied.

Hoarseness is frequently a symptom of advanced myxedema. The vocal cords are thickened, with rounded edges, pale and dry and vibrate less on phonation. Hypothyroidism should be suspected with the following syndrome: hoarseness, with examination of the larynx showing a small soft edematous teat at the junction of the anterior and middle third of the edge of each vocal cord. On phonation the teats appear much larger and vibrate against each other. They disappear except for a slight colorless pimple when the vocal cords are in abduction. The lesion is apparently a localized myxedematous infiltration. The basal metabolic rates range from — 20 to — 30 per cent. If the infiltration is recent, the vocal cords under thyroid therapy become normal in seven to ten days, but if the condition is discovered late the required period of treatment will be longer. Hoarseness or weakness of the voice may be caused also by hyperthyroidism. Mullin [15] pointed out that it is due to the same type of tremor and muscular weakness as that seen in patients with exophthalmic goiter when the fingers are extended.

Hypothyroidism occasionally causes tinnitus, impairment of hearing and, more rarely, vertigo, which, though the cardinal symptoms of Ménière's disease, are seldom severe enough to be classified as such. The functional hearing tests demonstrate either obstructive, mixed or nerve deafness. This type of obstructive deafness is that observed in chronic catarrhal otitis media with retracted tympanic membranes.

15. Mullin, W. V., in Jackson, C., and Coates, G. M.: The Nose, Throat and Ear and Their Diseases, Philadelphia, W. B. Saunders Company, 1929, p. 803.

Satisfactory inflation of the middle ear is difficult, as is, frequently, the passage of the bougie. The symptoms are completely relieved, or nearly so, by inflation but return within the hour. In nerve deafness, the position of the drum membrane is normal. It has been my experience with this syndrome that the basal metabolic rate of — 5 per cent is more accurate than that of — 15 per cent as an indicator of hypothyroidism. It is assumed that obstructive deafness is due to localized myxedema of the mucosa of the eustachian tube and tympanum and that localized myxedema of the labyrinth causes nerve deafness just as slow cerebration and scanning speech so often accompany advanced myxedema. In both types of deafness, desiccated thyroid in small doses seems to act as a hormone rather than as a diuretic. Drury [16] pointed out that thyroid extract improves the hearing and relieves the tinnitus. Considerable patience is usually necessary to determine the proper dose. However, though the hearing is improved, in my experience it rarely becomes normal, even after prolonged treatment.

It has been noted for a long time that potassium iodide improves the hearing and tinnitus in some patients with chronic catarrhal otitis media. Means [17] reported cases demonstrating that iodine may be used not only in the treatment but also in the diagnosis of hyperthyroidism. Politzer many years ago advised that the effectiveness of potassium iodide in restoring the hearing and diminishing the tinnitus is increased by alternating a period of administration of the drug with a period of discontinuance. It has since been observed that aqueous solution of iodine is used to best advantage for hyperthyroidism in the same way. While the improvement in hearing and decrease in tinnitus following the use of iodine may indicate hyperthyroidism, a basal metabolic rate has not as yet been demonstrated sufficiently high to suggest a diagnosis of hyperthyroidism. Consequently, it has not been proved that hyperfunction of the thyroid causes impaired hearing and tinnitus.

The thymus has probably been the ductless gland of greatest concern to the otolaryngologist. An epitome of the pathology is that the gland has two effects: mechanical pressure on the trachea and recurrent laryngeal nerves and a toxic effect on other tissues, especially the heart. The function of the gland is definite only in that it is concerned with the rate of growth. Rowntree [18] reported that a large dose of thymus extract depresses blood pressure and may cause sudden death

16. Drury, D. W.: Chronic Deafness: Endocrine Study of One Thousand Case Histories, New England J. Med. **201**:206-212 (Aug. 1) 1929.

17. Means, J. H.: Diagnostic Use of Iodine in Thyrotoxicosis, Ann. Int. Med. **7**:439-444 (Oct.) 1933.

18. Rowntree, L. G., in Glandular Physiology and Therapy, Chicago, American Medical Association, 1935, p. 395.

from complete auriculoventricular heart block. Anesthesia and crying increase the size of the thymus.

A place for status thymicolymphaticus as a clinical entity has recently been denied by several investigators. A number of conditions diagnosed as status thymicolymphaticus have been proved at operation or on autopsy to have other causes. Young and Turnbull [19] analyzed extensive pathologic and clinical data, with the conclusion that status lymphaticus is not a clinical entity. However, they reported the sudden death of 10 children during or following tonsillectomy, with no demonstration of other causes. In 8 cases the thymus was larger than normal, and in at least 1 it encircled the trachea. If these glands, already larger than normal, were further enlarged by crying, it seems quite possible that with the additional respiratory handicap of a general anesthetic sudden death could occur from mechanical interference with breathing. An additional factor to be considered is that a large increase in thymic secretion can have a toxic effect on the heart.

Status thymicolymphaticus seems to appear more often in two physical types. One is the "angelic child," and the other has a sturdy build, with a short, thick neck and protuberant abdomen. A history of "holding the breath" when crying suggests a roentgen examination for an enlarged thymus. With this selection of cases, it is unnecessary to require a routine roentgen examination of each child for thymic enlargement before tonsillectomy. Fortunately rarely, after a child has taken only a few breaths of ether vapor or during the tonsillectomy, respiration suddenly stops; cyanosis rapidly develops, and the pulse rate increases. The well known method of bringing the head well forward in full flexion on the chest and starting artificial respiration will practically always relieve the symptoms immediately. No further administration of the anesthetic should be allowed, for the patient sleeps for several hours even when only a small amount of ether has been used.

There are several forms of tetany. Gastric tetany and dyspneic tetany are due to alkalosis, but tetany as the symptom complex of neuromuscular irritability follows a fall in the calcium content of the blood. The latter type of tetany is the result of dysfunction of the parathyroids. Its three most frequent symptoms [20] are carpopedal spasm, laryngismus stridulus and convulsions. In laryngismus stridulus the onset is sudden, usually at night, with spasm of the glottis in a baby or young child. In the severer laryngospasms, dyspnea develops, with carpopedal contractures, cyanosis and increasing respiratory difficulty until breathing

19. Young, M., and Turnbull, H. M.: An Analysis of the Data Collected by the Status Lymphaticus Investigation Committee, J. Path. & Bact. **34**:213-258 (March) 1931.

20. Skelling, D. H.: The Parathyroids, St. Louis, C. V. Mosby Company, 1935, p. 124.

ceases. Then with a sudden inspiratory crow air enters the lungs; in a short time breathing is easy, and the child drops off to sleep. Spasm of the glottis, the obstetric hand and convulsions appear after thyroidectomy if the parathyroids have been inadvertently damaged. Trousseau's and Chvostek's sign are usually present, and the blood calcium is low. Kistner [21] reported 2 cases, and 2 reported by Lindner have already been mentioned. Kistner called attention to the laryngospasm as a Chvostek sign brought on by pulsations of the aorta and carotid arteries stimulating the recurrent laryngeal nerves.

It has long been realized that the hormones of the gonads have a definite otolaryngeal effect but without knowledge of either the substance or the reactions involved. Epistaxis at puberty and changes of voice in the male during adolescence are common observations. Thomson [22] recorded that the fetid odor in ozena is increased during menstruation and sometimes disappears during pregnancy. Occasionally, congestion or edema of the eustachian tubes sufficient to cause an obstructive type of impaired hearing is found during pregnancy, with disappearance of the aural symptoms on parturition.

Mortimer, Wright and Collip [23] placed the relation of estrogenic substances to the nasal mucosa on a definite and precise basis. They correlated, with controls, the action of estrogenic substances on the nasal mucosa in laboratory primates with clinical observations. They employed estrone (theelin), estriol (theelol) and emmenin.[24] They demonstrated that these substances have a specific physiologic influence on the mucous membrane of the turbinates during the menstrual cycle in the monkey and during pregnancy in women. The histologic change in the former is hyperemia followed by perivascular edema in the submucosa. When this is excessive, it leads to cellular infiltration, with permanent enlargement of the turbinates. The effect of estrogenic substances in such conditions as hypertrophic rhinitis and atrophic rhinitis cannot be ignored. The investigators treated 2 patients with atrophic rhinitis, with 2 others acting as controls, by the topical application of theelin in oil on the nasal mucosa. They reported improvement and the disappearance of crusting in the patients so treated. The crusts have rapidly diminished in size

21. Kistner, F. B.: Parathyroid Insufficiency: Report of Some Respiratory Cases, Tr. Am. Laryng., Rhin. & Otol. Soc., 1933, pp. 508-512.

22. Thomson, St. Clair: Diseases of the Nose and Throat, Comprising Affections of the Trachea and Oesophagus: A Textbook for Students and Practitioners, ed. 3, London, Cassell & Co., 1926, p. 201.

23. Mortimer, H.; Wright, R. P., and Collip, J. B.: The Effect of Oestrogenic Hormones on the Nasal Mucosae: Their Role in Naso-Sexual Relationship and Their Significance in Clinical Rhinology, Canad. M. A. J. **35**:615-621 (Dec.) 1936.

24. Emmenin (Ayerst, McKenna and Harrison) is said to represent a complex of estriol (theelol).

and amount in 4 patients (3 women and 1 man) with atrophic rhinitis whom I have treated by topical application of theelin to the nasal mucosa. While the crusts become smaller, they do not—in my limited experience—entirely disappear. The appearance of the nasal mucosa becomes almost normal, except for the crusting, because of its thickening and improvement in color. Theelin is as effective for men as for women. Its therapeutic effects on the nasal mucosa when it is injected intramuscularly are the same as when it is applied topically. The improvement in atrophic rhinitis derived from theelin is too great to permit one to ignore endocrine dysfunction in the etiology of the condition, but another endocrine factor seems necessary to insure complete recovery. The method is entitled to further trial.

Otosclerosis has been attributed by various otologists to a dysfunction of the adrenals, the parathyroids, the pituitary, the thyroid and the gonads. The clinician by noting the endocrine type of the patient or the effect of glandular therapy has found grounds for the faith—for faith it still largely remains—that otosclerosis in many patients is basically a form of endocrinism. The facts which support this view are that otosclerosis is frequently a familial disease, that the majority of occurrences are in women and that in women the onset or the exacerbation of the symptoms often coincides with puberty, menstruation, pregnancy and the menopause—the results of endocrine functions. On the other hand, not all patients with glandular disorders have otosclerosis, nor do all patients with otosclerosis present evidence of even slight endocrine dysfunction. The subject is now most confusing. The following suggestions are offered as one approach to the problem: Assume that chronic catarrhal otitis media is a clinical entity distinct from otosclerosis and that so far as the ear is concerned the initial lesions in the former are confined to the mucosa of the middle ear and those in the latter to the osseous labyrinth. Also, attribute to the endocrine hormones only those physiologic and pharmacologic actions which have received laboratory proof. Under these conditions thyroid extract has been shown to be therapeutically effective for chronic catarrhal otitis media and nerve deafness due to hypothyroidism. But there is no evidence that desiccated thyroid has any effect on the osseous labyrinth. Patients with impaired hearing improved by epinephrine probably have chronic catarrhal otitis media from hypothyroidism, for epinephrine has a synergistic action, increasing the effectiveness of the hormone of the thyroid, but no proof has been presented of its action on the labyrinthine capsule. Thus it is doubtful that epinephrine can have any effect on otosclerosis. The hormone of the parathyroids has the physiologic function of absorbing calcium from bone and also depositing it. But this is confined exclusively to the trabeculae and does not apply to the osteal cortex. It has no effect in healing fractures or absorbing callus.

Therefore, it could not absorb the osseous defect at Cozzolini's area. Otosclerosis occurs in men as well as in women. It is self evident that the ovarian hormones differ from the testicular. Consequently, a dysfunction of neither can *directly* cause otosclerosis. No evidence has been presented that the hormones of the posterior lobe of the pituitary —pitressin and pitocin—have any effect on the osseous labyrinth. While the relation of the somatotropic, the thyrotropic and the gonadotropic hormones and possibly of the metabolic hormones of the anterior lobe of the pituitary to otosclerosis is highly suggestive from a theoretic standpoint, actually the otologist must wait on the biochemist for substances sufficiently pure for definitive treatment before a decision can be made.

Otalgia, tinnitus, nerve deafness and furunculosis of the external auditory canal or nasal vestibule occur but rarely in diabetes mellitus. The differential diagnosis is established by demonstrating glycosuria or increased blood sugar. The administration of insulin and a diabetic diet causes an improvement in these complications. The furunculosis heals rapidly under this regime, but the involvements of the nervous system are slow to disappear. While nerve deafness is improved by insulin and diet, the hearing does not become normal in my experience, and it is exceptional for the tinnitus entirely to disappear. When otalgia occurs, it comes and goes with the rise and fall of blood sugar.

SUMMARY

The following conclusions are reached. 1. Foci of infection in the tonsils and paranasal sinuses may occasionally cause a dysfunction of the thyroid, pituitary body and parathyroids and depress the action of insulin, with systemic consequences. 2. A dysfunction of the thyroid, pituitary, parathyroid, pancreas or ovary may produce a pathologic condition in the nose, larynx or ear. 3. While these dysfunctions seem not to be a common occurrence, they are of sufficient importance to merit consideration.

1304 Walker Avenue.

ROLE OF THE SEPTUM IN SURGERY OF THE NASAL CONTOUR

SAMUEL COHEN, M.D.
PHILADELPHIA

To the rhinologist practicing surgical correction of the nasal contour the nasal septum no longer is only the nasal partition but is the foundation of the nasal pyramid. It consists of the following structures: the perpendicular plate of the ethmoid, the vomer, the septal cartilage with its wings (the upper lateral cartilages), the medial divisions of the lower lateral cartilages, the anterior nasal spine, the septal membrane, the crest of the maxilla and of the palate bone and the nasal spur of the frontal bone.

In this study the head in the erect position is to be considered, so that the various borders mentioned may be clearly visualized.

The perpendicular plate of the ethmoid is a thin, flat bone that fits into the upper part of the sutures between the nasal bones but mainly descends from the cribriform plate and rarely takes any part in the formation of an abnormal nasal contour. Its injuries or deviations have no effect on the nasal contour.

The vomer mainly supports the septal cartilage, but its own irregularities do not cause any nasal disfigurement unless a trauma to it causes expulsion of the septal cartilage from the vomerian groove.

The nasal septal cartilage is the most important constitutent of the septum from the standpoint of contour and must be taken up in detail.

The septal cartilage consists of two parts: first a straight, flat portion (that part which fills in the irregular space between the vomer and the perpendicular plate and the intranasal sutures); second, its wings, which project on each side from its anterior border, better known as the upper lateral cartilages. Embryologically these structures (the septal cartilage and its wings) are one. Therefore, nature intended them to be one. The septal cartilage is kept in the central place not only by its junction with the perpendicular plate and vomer but by these guy ropes (wings) which are attached to the bony margins of the piriform aperture. The wings put together are almost

From the Department of Laryngology, Graduate School of Medicine, University of Pennsylvania.

Read at a meeting of the Society of Plastic and Reconstructive Surgery, Philadelphia, Nov. 4, 1938.

as large as the straight part of the septal cartilage. The straight portion runs anteroposteriorly. The wings spring from its anterior border. Above them a prolongation of the anterior border fits into the intranasal suture. This prolongation may go behind the nasal spine of the frontal bone. Below, the wings separate from this anterior border, leaving a fissure on each side. Several small, independent pieces of cartilage are present, which may be lower extensions of the wings that have not completely chondrified in all parts. These extensions are parallel to the anterior margin of the straight part of the septal cartilage and often extend almost to its inferior angle, behind the bends of the lower lateral cartilages. They are important for two reasons: 1. They help support the structures of the nasal tip. If in a shortening operation they are not removed, a partial recurrence of the long nose will take place, as they will tend to push the tip downward again, or a new low hump may occur just above the nasal tip, for, while removal of a wedge of septal cartilage (base anterior) shortens the nose, these lateral prolongations of the wings may project into the space where the columella must meet the new border of the septal cartilage. 2. The wings of the septal cartilage add strength and mobility to the part of the nose just above the tip.

The septal cartilage has a posterior border which fits into a groove on the anterior surface of the vomer. Near its lower edge, i. e., at the posterior-inferior angle of the septal cartilage, this border splits to overlap (strut) a small bony protuberance, the anterior nasal spine. The hold this part of the cartilage has on the anterior nasal spine is strong, although the spine itself is fragile. In the dry skull it easily breaks off. The theory that dislocations of the posterior border of the septal cartilage from either the groove of the vomer or the anterior nasal spine are traumatic in origin, whether prenatal or postnatal, is doubtful. Other reasons must be found for these dislocations. In one family, 5 of 7 children had displaced septal cartilage. No distinct history of trauma or injury at birth (forceps) was present. It must take a peculiar force to throw the posterior-inferior septal angle off the anterior nasal spine. Moreover, dish face combined with displacement of the septal cartilage is rare. Trauma would break the anterior nasal spine and produce a depression, or the beginning of dish face. Displacement of the septal cartilage seems to be mainly hereditary.

There are cases in which superficial examination suggests displacement of the septal cartilage with lower nasal twist and a distinct history of injury is given. In these cases one usually finds the lower part of the septal cartilage thickened, with an irregularity of its margin, often a partial S shape, or it may be doubled.

The lower border of the septal cartilage is important. Its anterior-inferior end (anterior-inferior angle of the septal cartilage) is behind the nasal tip. Anteriorly, inferiorly and laterally are the lower lateral cartilages. Their medial plates (the columella) run below and parallel to it. The lower border of the septal cartilages is usually convex and separated from the columella by a fibroelastic (stretchable) membrane. Sometimes, it is overconvex, pushing the structures of the columella downward and producing "hanging columella" (a distinct nasal deformity). Most often, however, hanging columella is due to malformation of the columellar plates of the lower lateral cartilages, and when that is the case these must be resected. The border may protrude into one nostril more than into the other, often to such an extent as to produce a bad cosmetic and physiologic condition. In slightly more than its anterior half it is hugged by the upper borders of the columellar plates of the lower lateral cartilages. In its lesser, posterior half, it pushes the upper lip forward and so aids in the prevention of the deformity known as dish face.

Sometimes the lower part of the septal cartilage, at the anterior-inferior angle, projects forward and above the two bends of the lower lateral cartilage, so that a cartilaginous hump is noted on the anterior border of the nose, just above the nasal tip. Sometimes this excess of the lower cartilaginous septum may produce a combination of hump and false saddle nose.

The superior border of the septal cartilage, that part which is attached to the perpendicular plate, is of no consequence in nasal deformities.

The wings of the septal cartilage are thick where they spring from the anterior border and thin out posterolaterally so that near the central line of the nose they are strong. They are attached to the bony margins of the piriform aperture by strong fibrous tissue and often underlie it, beveling the edges. At their lower borders they tend to underride the lateral wings of the lower lateral cartilages. Rarely do they override them. The attachments are powerful, and it takes a great force to tear them apart. The wings are usually convex from the midpart of the cartilaginous nasal structure. When concave, they produce a poor-looking nasal contour and also some difficulty in breathing. This condition may be corrected by performing a submucous removal of the wings and either reversing them individually or changing them from the right to the left side and vice versa. I have never observed such a case. When in a narrowing operation more of one wing than of the other is removed, the central position of the straight part of the septal cartilage becomes displaced, and a twist will be noted when healing has taken place. To correct this error, a piece must be taken out of the larger wing, or a piece of cartilage must be placed where too much was originally removed.

The forward protrusion of the cartilaginous part of a nose depends on the size of the septal cartilage proper. It follows, therefore, that to reduce this protrusion, sections of the septal cartilage at its anterior border from the base toward the tip, must be taken out. Contrariwise, if the forward protrusion is insufficient, sections may be inserted along this border. Dr. L. A. Peer [1] does a submucous resection and reverses a piece of the patient's own septal cartilage to attain the necessary increase in the nasal protrusion.

When a submucous resection is performed, in order to avoid changes in the nasal contour the following rules are important: First, septal cartilage should not be removed too near the anterior or the lower border; second, force should be avoided and dull forceps should not be used in removing pieces of the septal cartilage. Supratip depressions are too often seen after submucous resections. A sufficient anterior and inferior septal border should be left as support. Septal

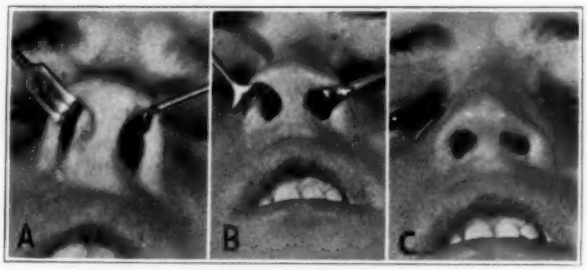

Fig. 1.—*A*, displacement into the right nostril of the septal cartilage in a child. *B*, septal cartilage replaced in the midline by operation. *C*, view shown in *B*, without the nasal retractors.

abscess is a frequent cause of supratip deformities and can be prevented by using better asepsis and antisepsis in submucous resection. Thorough cleansing away of all blood clots, spicules of bone and of other possible irritants by the application between the flaps of swabs dipped in alcohol may prevent the formation of a septal abscess. If one does occur, however, it should be opened early, in the hematoma stage if possible. Dr. G. B. Wood [2] removes a piece of one wall of the abscess with a punch, making a window to get better drainage. If a supratip depression is noted at the time of the submucous resection or later, the simple insertion of an appropriate piece of cartilage will correct the deformity.

Parts of the nasal tip go into the formation of the nasal septum. These are the columellar cartilages and their coverings, the bends of

1. Peer, L. A.: Operation to Repair Lateral Displacement of Lower Border of Septal Cartilage, Arch. Otolaryng. **25**:475 (April) 1937.

2. Wood, G. B.: Personal communications to the author.

the columellar cartilages and the fibroelastic membrane that connects them to the lower border of the septal cartilage. The lower lateral cartilages determine the shape of the nasal tip, but its support is the septal cartilage. Textbooks divide the lower lateral cartilages into two portions, the lateral plates, which form the side of the nostril, and the medial plates (curved, backward extensions), which go into the formation of the columella. It is more clarifying to divide them into three parts, (1) the lateral plates, (2) the columellar plates and (3) the bends, or narrow strips of curved cartilage that connect the two plates. The bends are tied to each other by connective tissue and are located anterior to the anterior-inferior angle of the septal cartilage.

The columellar plates follow the lower border of the septal cartilage for a little over one-half its length. Posteriorly they are often hook-

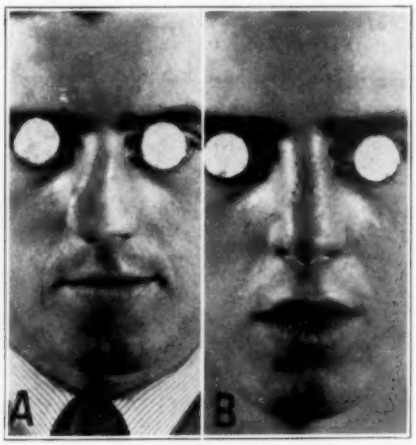

Fig. 2.—*A*, lower part of the nose twisted to the right. *B*, result of the removal of a small nasal hump and replacement of cartilage.

like processes which may project into the nostrils. Occasionally the upper edges of these strips of cartilage may project so much as to be prominent in one or both nostrils. The columellar plates may be large, causing nasal deformity and obstruction to breathing. Their partial submucous removal is fairly simple. The nasal tip will not drop, no matter how much of the columellar cartilage is removed.

The fibroelastic membrane that connects the columellar cartilage with the lower border of the septal cartilage is important and interesting. It is the septal membrane. Slight pulling will demonstrate how stretchable and strong it is. It is mobile. Through it incisions are made to separate the columella from the septal cartilage in the ordinary plastic operation on the nose. It greatly helps the mobility of the tip.

It is triangular and to a certain extent goes over the anterior-inferior septal angle, thus permitting the nasal tip to ride over this end of the septal cartilage. It can usually be stretched to 5 mm. In cases of displaced septal cartilage it can be stretched to 15 mm. or more on the side of the displacement. Removal of some of this excess may be necessary.

The incision through this fibrous membrane must hug the lower border of the septal cartilage, leaving as much as possible of the membrane attached to the columellar structures. When too much is removed, the nasal tip feels stiff after healing has taken place; and the lower border of the septal cartilage is too near the columella and the mobility of the tip is thus lessened. The membrane is so important that it may be better to avoid using the Joseph suture technic (suturing through all the structures that surround the septal cartilage and the columellar cartilages) when closing the columellar-septal gap. It is better to sew the cutaneous edge of each side of the septal membrane to the cutaneous covering of the septal cartilage of that side. Undue tension of the sutures should be avoided. This method of suturing, saving more of the stretchable membrane, will give a less tense and more mobile nasal tip.

The anterior nasal spine is located about ⅛ inch (0.32 cm.) in front of the vomer. It is a bony projection (fragile but strong) on the nasal floor, formed by contributions of each maxilla. It supports the posterior-inferior angle of the septal cartilage. When it is missing, the deformity known as scaphoid face (dish face) appears. This deformity is usually congenital and often associated with saddle nose. It is one of the most difficult conditions to correct. When the deformity is mild, insertion of a small piece of cartilage between the spine or the place where it should be and the upper lip will help fill out the labial depression. Another procedure is the following: The periosteum and perichondrium are dissected off the inferior part of the septum and the nearby vomer. The septal cartilage is next lifted out of its bed in the vomer, and one or more pieces of cartilage are placed in this space. The whole lower part of the nose is thus pushed forward. Sometimes the anterior nasal spine may be too prominent, pushing the lower lip too far forward. For this condition a small strip of the spine and a strip of the lower border of the septal cartilage may be removed.

The nasal spine of the frontal bone extends downward behind the nasal bones. It forms a part of the nasal septum in that region. It helps underpin and strengthen the union of the nasal bones with the frontal bones. In operations it prevents satisfactory fracturing and remobilizing of the nasal bones.

The various septal crests, such as the maxillary, the palatal and the sphenoid, are of little importance in cases of nasal deformity.

Deviations of the nasal septum may produce nasal deformity, especially deviations of the septal cartilage. Deviations of any part of the bony septum rarely produce a nasal irregularity. Injuries to the bony part of the nose may produce irregularities of the bony septum, but the correction of deviations of the bony septum alone in no way corrects the external nasal irregularity. Irregularity of the nose produced by deviation of the septal cartilage may be corrected by proper attack on the cartilaginous deviation. It is important to study these deviations carefully and to map out a technic for each one individually. The operator should do his own septal correction if possible, and in the majority of cases it is best done at the same time as the plastic operation. I do not believe in doing a submucous operation before the plastic operation, for two reasons: First, there is great danger of

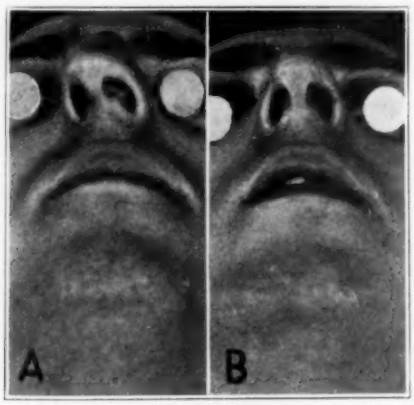

Fig. 3.—*A*, vestibular view of the patient shown in figure 2; the lower part of the nose is twisted to the right and the septal cartilage displaced into the left nostril. *B*, vestibular view of the same patient after operation.

removing too much of the lower or the anterior border of the septal cartilage; second, the contraction of the scar following the plastic operation (between the new lower septal border and the columellar cartilages) may be so strong as to pull the tip backward or sidewise. The weakened cartilage may not have the strength to resist this pull. Let me cite a case. I performed a submucous resection on a young woman and six weeks later did an ordinary plastic operation. This patient was observed for six weeks and her postoperative casts taken; she showed a pleasing improvement over her previous condition. Two years later the tip of her nose flattened.

Septal deviation is a normal nasal condition and therefore should be corrected only when it produces symptoms. Submucous resection should be conservative rather than complete. Only that part of the deviation should be corrected which causes obstruction to breathing

or aeration of the sinuses. If possible, correction should be done at the same time as the plastic operation, and as little as possible of the cartilaginous structure should be removed. A transposition of cartilages may be preferable. Sections of the septal cartilage can be rearranged, one piece in front of the other, and little if any removed. Another method is to crisscross and push the cartilage toward the center line or cut out a sliver of cartilage at the deviation and push the rest to the midline. It may even be unnecessary to elevate the mucosa. One may simply cut through the septal bulge (but not through the opposite mucosa) and push the structures to the center line. This form of septal operation can well be performed on children, and there need be little fear of future distortion due to disturbance of the growth centers. In children a submucous resection is not advisable, but in cases of extreme

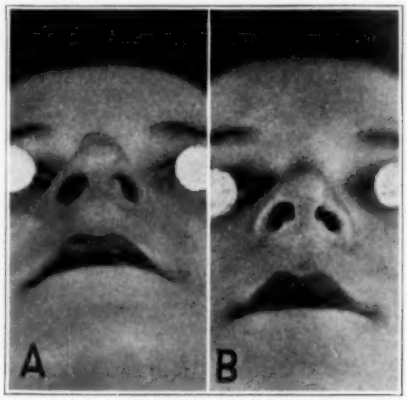

Fig. 4.—*A*, displacement of the septal cartilage into the left nostril combined with humped nose. *B*, result of removal of the hump and replacement of the septal cartilage.

septal deviation a replacement operation may be done. A submucous operation several months after a plastic operation on the nose is a good procedure.

Displacement of the septal cartilage often causes flattening or deviation of the tip, distortion of the alae, nasal obstruction or other symptoms. In cases in which the cartilage is displaced slightly from the anteribr nasal spine (and vomer) the nasal tip may still be centrally placed. If the displacement is marked, however, the tip is usually pulled to the side of the displacement. For such a condition the following operation is suggested. I have performed it on a child as young as 5 years with gratifying cosmetic and physiologic results. The steps are, briefly, intercartilaginous incision and separation of the columella and the septal membrane from the lower border of the septal cartilage, elevation of the skin and the structures of the nasal tip from the

anterior septal border, incision through the fissure on each side of the anterior septal border, separation of the mucosa on one side of the septum, removal of a wedge of septal cartilage at the angle, elevation from the vomer and centralization of the septal cartilage, cutting of the attached mucosa along the side of the vomer, adjustment of the upper lateral cartilages, splitting of the upper end of the septal membrane, insertion into the split of the lower septal border and application of suture.

The nasal tip should be centrally placed and have some firmness on palpation. The firmness of the tip depends on the lower part of the septal cartilage, its straightness and its distance from the end of the nose. The further the septal cartilage from the end of the nose, the softer the tip will be. The more irregular the lower part of the septal cartilage, the softer the tip will be. When the tip is too far down, the lower lateral cartilages may simply hang on the anterior edge of the septal cartilage, and correction may be accomplished by removing wedges of the upper lateral cartilages and attaching the lower lateral cartilages to them. Patients with large lower lateral cartilages may have for their main symptom a dependent tip. In such cases a certain amount of the upper border of the lower lateral cartilages near and including the bend is removed and the rest attached to the upper lateral cartilages.

Septal perforation is found in cases in which plastic correction also is needed. If the perforation is small, pushing together, approximation and sewing may suffice for closure when the plastic operation is done. A large septal perforation adds difficulties to a corrective operation on the nose. In 1 case a good end result was obtained by sewing the columellar structures to the septal cartilage and the upper edge of the lateral plate of each lower lateral cartilage to the lower edge of each upper lateral cartilage. This technic may be advisable also after submucous resection when the remainder of the septal cartilage can stand little strain. If an operation for septal closure is contemplated, it is better to perform it before the plastic operation.

The septum should always be carefully examined to see if it will interfere with the proper readjustment of the nasal walls and a technic mapped out beforehand for its correction at the time of operation.

Prevention of deformities of septal origin involves careful attention to nasal injuries with swelling of the bridge and nosebleed, and even if the intranasal examination shows no abnormality it is advisable to pry the nasal structures forward, as stressed by Blair and Brown [3] and others. This may prevent later buckling of the septal cartilage.

2009 Pine Street.

3. Blair, V. P., and Brown, J. B.: Surg., Gynec. & Obst. **53**:797 (Dec.) 1931.

OTITIC INFECTIONS DUE TO THE PNEUMOCOCCUS TYPE III

J. L. MAYBAUM, M.D.
AND
J. G. DRUSS, M.D.
NEW YORK

The pneumococcus type III, because of its virulence and tendency to produce intracranial complications, has been a source of concern to the otologist ever since Schottmüller [1] described this organism in 1903. He named it Streptococcus mucosus because of its mucus-producing property on blood agar cultures. It was his impression that he was dealing with the same organism that Richardson [2] had described two years previously but had called Pseudopneumococcus. Since that time the pneumococcus type III has been erroneously classified as a streptococcus and the term Str. mucosus has remained more or less fixed in the minds of physicians. In spite of the fact that in 1927 it was definitely established and classified as the pneumococcus type III according to bacteriologic standards of bile solubility, agglutination and precipitation, the organism at the present time is still referred to by some as Str. mucosus. It is advisable that this misnomer be abandoned and the correct term—Pneumococcus type III—be universally adopted.

Notable is the fact that in 3 of the 7 cases first described by Schottmüller in which this organism was obtained the condition was of otitic origin. In each of these 3 the infection terminated in bacterial meningitis, and the organism was recovered from the spinal fluid. The same author at that time made the interesting clinical observation that the mastoid bone was involved relatively early, that the tympanic membrane showed slight changes and that the meningitis was of a fulminating nature, occurring within one week of the onset of the otitis.

Neumann, Ruttin and Gohn,[3] in 1909, were among the first to draw the attention of the otologist to the pneumococcus type III. They con-

---

From the Otologic Service and the Department of Laboratories of the Mount Sinai Hospital.

1. Schottmüller, H.: Die Artunterscheidung der für den Menschen pathogenen Streptokokken durch Blutagar, München. med. Wchnschr. **50**:849 and 909, 1903.

2. Richardson, O.: Pseudo-Pneumococci in Lobar Pneumonia, J. Boston Soc. M. Sc. **5**:499, 1901.

3. Neumann, Ruttin and Gohn, cited by Gontikas, C.: Contribution à l'étude des otites dues aux Steptocoques mucosus, in Livre d'or à l'Occassion du Jubilé de Theod. L. Papa Yoamnoa, Naumburg-Saale Lippert & Co., 1932, p. 120.

sidered this organism the causative factor in the production of a characteristic clinical otologic picture, with which otologists are more or less familiar at the present time. Since that time, although many references to this subject have been made in the literature both here and abroad, few authors have entered into a comprehensive analytic study of infections by the pneumococcus type III. Thus, there appeared reports of cases by Krüger,[4] Moulonguet and Piton,[5] Mathé,[6] Urbantschitsch,[7] Brunner [8] and others. Richter [9] in 1929 and Claus [10] in 1930 published more detailed reports on this subject. The Japanese authors Ko and Kadiura [11] have contributed papers on the experimental biologic properties of the organism.

Realizing the importance of the pneumococcus type III infection to otology and the relative scarcity of references to this subject in the literature, we have reviewed all the cases of pneumococcus type III mastoiditis observed in the otologic service at the Mount Sinai Hospital during the past nine years (1929 to 1937).[12] These totaled 73. Only those cases were included in which a definite diagnosis was established by recovery of the organism on culture of material obtained from the middle ear or the mastoid at operation or of the blood or spinal fluid. From our clinical experience with the type of otologic infection under discussion and from an analytic study of the cases observed, our concept of the varying character of this clinical entity has been further enlarged.

Sex: Of the 73 patients 55 were male and 18 female. A proportion about the same as for the usual otitic infection.

Age: With the exception of a definite preponderance of pneumococcus type III infections in the aged, there was essentially no difference in the age incidence of otitic infections due to this organism and to the

4. Krüger: Ein klinisch und anatomisch durch gearbeiteter Fall von Mucosusotitis, Zentralbl. f. Hals-, Nasen- u. Ohrenh. **19**:157, 1932.

5. Moulonguet and Piton: Un cas de méningite auriculaire à streptococcus mucosus; guérison, Zentralbl. f. Hals-, Nasen- u. Ohrenh. **19**:223, 1932.

6. Mathé: Cystenbildung im Einschmelzungsherd bei Mucosusotitis, Zentralbl. f. Hals-, Nasen- u. Ohrenh. **19**:158, 1932.

7. Urbantschitsch, E.: Zur Frage der Mucosus Meningitis, Monatschr. f. Ohrenh. **66**:1296, 1932.

8. Brunner, V. H.: Mucosusotitis, Mucosusmastoiditis bei negativem Roentgenbefunde, Monatschr. f. Ohrenh. **69**:1005, 1935.

9. Richter, H.: Warzenfortsatz Pneumatisation und Mucosuseiterung, Ztschr. f. Hals-, Nasen- u. Kehlkopfh. **25**:74, 1929.

10. Claus, G.: Die Bedeutung der Erregerart für die Prognose der Mittelohreiterung, Zentralbl. f. Hals-, Nasen- u. Ohrenh. **15**:625, 1930.

11. Ko, S., and Kadiura, K.: Ueber Mucosusotitis, abstracted, Zentralbl. f. Hals-, Nasen- u. Ohrenh. **15**:148, 1930.

12. Dr. I. Friesner permitted us to study the cases in his service during the seven years 1929 to 1935.

streptococcus. More than half of the cases—38, or 52 per cent—occurred in the fifth, the sixth and the seventh decade. We have also observed that not only is pneumococcus type III otitis relatively less frequent in children than in adults, but it is less virulent. In children the pneumococcus type III does not give the same concern as it does in adults.

It is believed that pneumococcus type III otitic infections are prevalent among those suffering from diabetes or other debilitating diseases. Diabetes was present in 12 of the 73 cases in this series. The incidence of diabetes in pneumococcic infections is definitely higher than in other otitic infections.

TYPES ACCORDING TO CLINICAL COURSE

In an analysis of the cases we observed that with regard to the clinical course a division into three groups could be made. A sharp line of demarcation between these groups was not always possible. The following divisions were made:

1. Prolonged insidious clinical course with few or no physical signs, followed by evidence of mastoiditis or intracranial complication (18 cases).

2. The usual clinical course of infection of the middle ear, followed by evidence of mastoiditis or intracranial complication (53 cases).

3. Short clinical course (two to five days), followed by intracranial complications (2 cases).

It should be noted that type 3 corresponds more or less to the type described by Schottmüller [1] in 1903 and to the so-called *foudroyante* type reported by Ruttin [13] in 1934. Type 1 is the one to which most frequent reference is made in the literature and with which physicians are most familiar.

SYMPTOMS

While in the majority of cases studied the otitis was ushered in by an infection of the upper part of the respiratory tract, usually of influenzal type (44 of 73 cases), not infrequently no such history was elicited. In 8 instances the otitis set in shortly after swimming.

Pain in the ear or in the mastoid region, commonly observed in streptococcic infections, is also a frequent complaint in this form of otitis. Hemicranial pain was a frequent complaint (44 cases). Pain in the eye was present in 4 cases. Of particular importance was the absence of otalgia throughout the otitis, though signs of mastoiditis or intracranial complication subsequently developed.

---

13. Ruttin, E.: Foudroyante Mucosus Meningitis, Zentralbl. f. Hals-, Nasen- u. Ohrenh. **22**:208, 1934.

Tinnitus or fulness in the ear was present in 11 instances. While it may be associated with other symptoms of otitis media, it is important to remember that it may be the only symptom throughout the illness. Such was the case in 4 instances; in 1 of these treatment for four months before admission to the hospital consisted of catheterization of the eustachian tube, after which aural examination disclosed definite evidence of mastoid involvement.

A not unusual observation which we feel is somewhat characteristic of pneumococcus type III infection is a latent period during the clinical course, followed by a return or exacerbation of symptoms. This was noted in 7 instances.

TYPES ACCORDING TO AURAL SIGNS

The otoscopic picture may be of one of the following types:

1. Picture of acute suppurative otitis usually seen in streptococcic infections.

2. Resolving middle ear following a suppurative process. The drum is thickened; landmarks are visible to varying degrees; there is no discharge, and occasionally there is sagging of the posterosuperior canal wall.

3. Dry middle ear—absence of discharge throughout illness (from history).

4. Influenzal picture—blebs on the tympanic membrane and in the external canal.

5. Mucoid discharge from the tympanum throughout the course of the otitis.

Comment on These Types.—Type 1. Those cases of Pneumococcus type III otitis in which the tympanic membrane resembles that in the usual streptococcic infection present a type 1 picture and are by far the most frequent. Since there are no characteristic changes, the picture being familiar to all otologists, this group will receive little comment. It must not be construed, however, that this type may not run a prolonged insidious course, or a short clinical course terminating in an intracranial complication (types 1 and 3 according to clinical course, previously described). Because of the resemblance of this otoscopic picture to that seen in the usual streptococcic infection, the importance of determining the type of organism can readily be understood.

Type 2. Acute mastoiditis or intracranial complication in the presence of a resolving middle ear is characteristic of pneumococcus type III infection. In such instances there is a cessation of the aural discharge; the landmarks show evidence of reappearing; radiating vessels can be seen on the drum, and the patient is apparently recovering. Postauricular tenderness may or may not be present. Occasionally there exists sagging

of the superior canal wall, associated with spontaneous otalgia or headaches. Such an otologic picture may be followed abruptly by an intracranial complication. We have histologic sections demonstrating extensive destruction in the petrous pyramid in the presence of a resolving middle ear.

Type 3. The tympanic membrane may be dull gray and somewhat thickened, and some of the landmarks are still visible. While this picture may be associated with signs of mastoiditis and thus resemble type 2 just described (with the exception of the absence of aural discharge at any time), there may be but few symptoms, such as fulness or tinnitus in the ear for a prolonged period. Repeated roentgen examinations are of paramount importance in such instances. That mastoiditis may exist in the absence of aural discharge is well known. We are not concerned here with infants in whom subperiosteal abscess in the absence of aural discharge is not an infrequent finding. An intact drum with involvement of the mastoid is more commonly observed in infections by the pneumococcus type III than in those by the streptococcus.

Type 4. The so-called influenzal type with blebs on the drum and canal requires but little comment. As is well known, the influenza bacillus is seldom found. While the streptococcus is the organism usually recovered, it should be borne in mind that the pneumococcus type III may be the sole invader.

Type 5. It is stated in the literature that the presence of a mucoid aural discharge over a prolonged period is characteristic of pneumococcus type III otitis. We have found this in but 2 instances. In general, the character of the aural discharge does not give one a clue to the type of invading organism.

IMPAIRMENT OF HEARING

Marked impairment of hearing is often present. It was observed in 46 of the 73 cases. Of particular significance is pronounced impairment of hearing in the presence of an apparently normal tympanic membrane. The drum may be but slightly thickened, the ear dry and the landmarks partly visible; nevertheless, the hearing is impaired to the extent that a forced whisper is not heard. These findings should make one suspicious of Pneumococcus type III infection. While marked impairment of hearing is usual, in some instances the hearing may be but little affected. Seven patients with exceptionally good hearing had evidence of mastoiditis, which was verified at operation.

TENDERNESS OVER THE MASTOID

Tenderness over the mastoid is undoubtedly of significance in the diagnosis of postauricular involvement in the majority of cases, as with all other types of infection of the mastoid. It was noted in 49 cases

studied. Worthy of mention, however, is the fact that in a fairly considerable number of instances this important sign was absent throughout. Suggestive of the insidious nature of the infection was the occurrence in 7 cases of a subperiosteal abscess, preceded by a more or less symptomless course. It is of importance to emphasize the point that all the patients in this group were in the fifth or the sixth decade.

BACTERIOLOGY

The pneumococcus type III, as is well recognized, is an exceedingly virulent organism, owing among other things to the fact that it is surrounded by a resistant capsule. Biologically the pneumococcus type III differs from the streptococcus in that the virulence of the former does not vary to any appreciable degree as does that of the latter. A characteristic feature of the pneumococcus type III infections of the mastoid is the tendency to gradual but extensive invasion of the contiguous structures. The view generally accepted is that this organism rarely invades the large venous radicles, which may account for the comparative infrequency of sinus thrombophlebitis.

Although the pneumococcus type III is the infecting organism in the middle ear, Streptococcus haemolyticus may be recovered from the mastoid. This observation was made in 4 of the cases herein described. Overgrowth of the pneumococcus type III in the mastoid by the streptococcus is the explanation offered for this occurrence. Similarly, cultures of the discharge from the middle ear may repeatedly reveal the presence of Staphylococcus aureus. The latter not infrequently overgrows the pneumococcus and thus for a time obscures the bacteriologic diagnosis.

The bacteriologic characteristics of Pneumococcus type III just referred to are some of the views expressed by Gregory Shwartzman, bacteriologist at the Mount Sinai Hospital. It is our impression that this organism is frequently dormant in the accessory nasal sinuses and when activated by an acute infection of the respiratory tract may secondarily invade the ear. In 4 instances an infection of one ear by the pneumococcus type III was followed by an involvement of the other ear by the same organism after a free interval of one and one-half to two years.

ROENTGEN EXAMINATION

In general, we may state that the roentgen findings in themselves are not sufficiently characteristic to warrant a diagnosis of pneumococcus type III infection. In our experience only rarely has the roentgen examination disclosed the "mottled appearance" believed to be suggestive of a destructive process in the bone due to this organism. A

roentgenogram showing such a picture, however, has been of inestimable value in establishing the diagnosis of mastoiditis in those cases in which there are few signs or symptoms. Shortly after the diagnosis of pneumococcus type III otitis is made, recourse to repeated roentgen examinations of the mastoid is advisable, in order not to overlook progressive inflammatory changes in the mastoid and petrous pyramid.

OPERATIVE FINDINGS

Before describing the operative findings, reference should be made to the interval between the onset of the aural infection and the beginning evidence of involvement of the mastoid. The average duration of symptoms (obtained from the history) prior to surgical intervention was thirty-three days. This is a longer interval than is ordinarily observed in streptococcic invasions of the mastoid. Among the cases herein described there was an interval in 1 of five months, in 3 of four months and in 2 of three months.

Mastoidectomy was performed in 69 cases. In a considerable number of these there were no characteristic changes in the bone, the operative findings differing in no way from those of the usual type of mastoiditis. Of importance was the presence in 41 instances of extensive destruction of bone in the mastoid. Marked softening of the bone without actual pus formation was a frequent observation. In addition, a mucoid exudate was occasionally seen. Extensive softening of the bone or a mucoid discharge frequently aroused our suspicion of pneumococcus type III infection, which was subsequently verified by culture. In 23 cases a perisinal abscess was noted, and in 9 an epidural abscess of the middle or posterior fossa. In many instances the destructive processes had extended into the petrous pyramid. Mention was previously made of the rather unusual finding of a subperiosteal abscess in 7 adults.

The postoperative course in the majority of cases observed at the hospital during the past seven years was uneventful. In the decade preceding the period included in the present investigation complications were more commonly encountered. The improvement in the outcome can be ascribed possibly to variations in the virulence of the organism—although, as previously stated, we doubt this—to earlier diagnosis and to more prompt surgical intervention. A specific vaccine, as recommended by Goldman, Shwartzman and Herschberger,[14] was administered to practically all patients in the past seven years. While the use of the

14. (*a*) Goldman, J. L.; Shwartzman, G., and Herschberger, C.: Prophylactic Vaccination Against Intracranial Complications Following Pneumococcus Type III Mastoiditis, Arch. Otolaryng. **21**:154 (Feb.) 1935. (*b*) Goldman, J. L., and Herschberger, C.: Prophylactic Vaccination Against Intracranial Complications Following Pneumococcus Type III Mastoiditis, J. A. M. A. **109**:1254 (Oct. 16) 1937.

vaccine suggests that this form of therapy is an important factor in the favorable results obtained, the number of cases has not been sufficient to warrant a more definite conclusion.

COMPLICATIONS

In general it can be stated that otitic infections due to the pneumococcus type III are more prone to give rise to intracranial complications than infections of streptococcic origin. Of the complications, meningitis is common. It occurs either early—that is, in the first week of the otitis—or, more commonly, late, after an insidious course with evidence of extensive disease in the temporal bone. Thus, in 4 of our cases meningitis developed during the first week of the otitis and in 8 it occurred much later.

Extension of the inflammatory process to the petrosa is not uncommon. Suppuration in this structure was found in 13 cases, in 8 of which the diagnosis was made clinically. In the remaining 5 there were no physical signs or symptoms, the diagnosis having been made by postmortem or histologic examination.

Thrombophlebitis of the sigmoid sinus and jugular bulb, as previously stated, is a comparatively uncommon complication. It occurred in only 3 cases. It is of importance to emphasize the point that the clinical course of sinus thrombophlebitis due to the pneumococcus type III not infrequently is atypical and may be asymptomatic throughout. The diagnosis in such instances is made by recovering the organism from the blood.

Labyrinthitis complicated the otitis in 3 instances; in 2 of these the diagnosis was made clinically and in the third only from histologic sections. Three other patients showed clinical evidence of mild labyrinthine irritation.

Abscess of the temporal lobe was present in 2 instances. Here again this complication occurred as a late development in the prolonged course of the otitis.

Erysipelas was observed in only 2 cases. It is our impression that it is seen much more frequently with streptococcic infections of the ear than with infections due to the organism under discussion. The erysipelas which occurs in the course of pneumococcus type III otitic infections is produced by the streptococcic organism, which acts as a secondary invader.

MORTALITY

Of the 73 patients studied, 59 were discharged as improved and 14 died, a mortality rate of 18 per cent. The vast majority of patients were observed for three or four months postoperatively in the outpatient department.

TREATMENT

With full realization of the insidious nature of this infection and its tendency to produce intracranial complications, the necessity for early diagnosis and thorough surgical intervention must be borne in mind. In cases of suspected pneumococcus type III otitis myringotomy in the early stages is indicated, for the purpose of determining the type of the invading organism. When the bacteriologic diagnosis is established from culture of the exudate from the middle ear a vaccine should be prepared and a series of treatments by intradermal and subcutaneous injection promptly administered, as recommended by Goldman, Schwartzman and Herschberger.[14a]

The diagnosis of acute mastoiditis having been made, a mastoidectomy complete in the accepted sense of the word should be performed. In addition to the customary technic of so-called simple mastoidectomy, particular attention must be directed to thorough exenteration of certain areas: the zygoma, solid angle, perilabyrinthine region and any suggestive tract leading into the petrous pyramid. The semicircular canals should be thoroughly skeletonized. The postauricular wound should be kept wide open, as there is frequently a tendency to rather rapid but superficial healing of the mastoidectomy wound, and during the course of such rapid healing an advancing destructive process may exist in the deeper parts, i. e., the petrous pyramid. Because of the possibility of late complications it is advisable that the patient be observed for about three months after complete healing of the mastoidectomy wound and middle ear. We have not as yet had an opportunity to determine the efficacy of sulfanilamide in the treatment of meningitis due to the pneumococcus type III. Favorable reports regarding the use of this drug in the treatment of this disease have recently appeared in the literature. We believe that sulfanilamide should be employed in massive doses as soon as the diagnosis is made. It is now established that sulfapyridine (2-[paraaminobenzenesulfonamido]-pyridine) is highly effective in combating infections due to the pneumococcus.

PATHOLOGY

Histologic examination of the temporal bone in serial sections was made in 9 cases. The outstanding pathologic feature is extensive necrosis throughout the various structures within the temporal bone, i. e., the mastoid, the petrosa, the labyrinth, the carotid canal and the meningeal coverings. The findings of a resolving inflammatory process in the tympanum and mastoid with evidence of a progressive extension of the disease medially in the petrosa is not infrequent. Confirming a not uncommon operative finding is the observation on histologic exam-

ination of an extensive necrotic process with relatively little purulent exudate. It must be mentioned that frequently there are no features differentiating the microscopic picture of this type of infection from that of streptococcic infections.

The following 3 cases are presented somewhat in detail because of certain characteristic clinical and pathologic features:

REPORT OF CASES

CASE 1.—A. G., a man aged 29, was admitted to the hospital on Oct. 21, 1929, with a history of otalgia on the right following an infection of the upper part of the respiratory tract three weeks previously. This was followed in one week by spontaneous discharge from the middle ear, postauricular pain and temporal head-

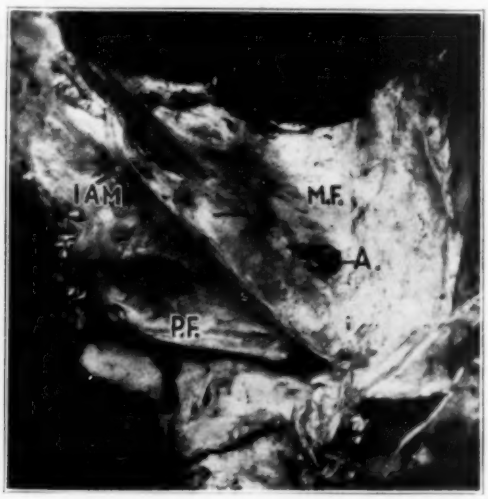

Fig. 1 (case 1).—Gross specimen of the temporal bone, showing a large circular punched-out defect in the dura of the middle fossa, in the region of the roof of the antrum. *A.* indicates perforation; *I.A.M.*, internal auditory meatus; M.F., middle fossa, and *P.F.*, posterior fossa.

ache on the right. On admission examination disclosed a mucoid discharge from the middle ear and frank signs of mastoiditis. Culture of the aural discharge showed the presence of the pneumococcus type III. A mastoidectomy was performed. Extensive disease of the bone was encountered. Several days after the operation the headache increased in severity and meningeal signs—vomiting, slow pulse, rigidity of the neck and bilateral Kernig sign set in. Lumbar puncture showed gram-positive diplococci on smear. Meningeal signs progressed in spite of vigorous therapy, and the patient died twenty days postoperatively. Postmortem examination revealed a circular perforation in the dura of the middle fossa, in the region of the antral roof, measuring 8 by 5 cm. (fig. 1). Herniation of the brain at this site and thrombosis of the posterior temporal artery were present.

Histologic examination of the temporal bone showed a marked inflammatory reaction in the tympanic and mastoid cavities. The dura of the middle fossa was extremely thickened and necrotic in areas. There were perforation through the necrotic dura in the region of the roof of the tympanum (fig. 2), evidence of extensive petrositis and necrosis of bone extending to the extreme tip of the apex. The carotid canal had been destroyed by disease. There was a purulent exudate in the meninges.

Comment.—This case demonstrates the interesting clinical observation of a mucoid aural discharge three weeks after acute otitis with signs

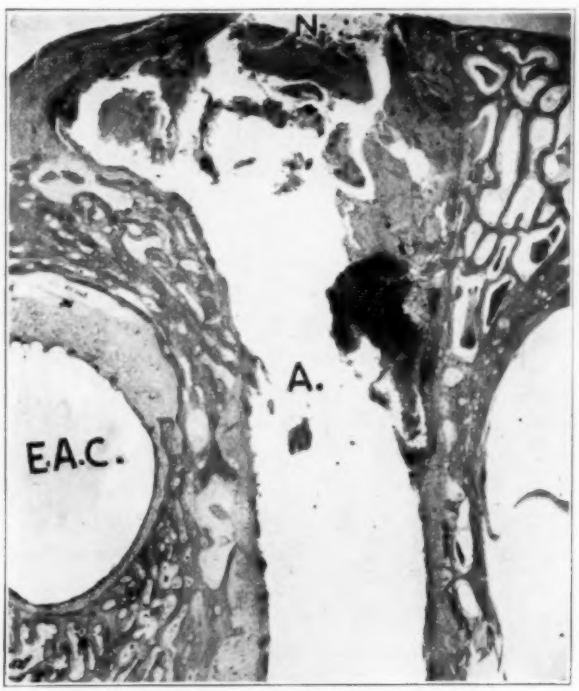

Fig. 2 (case 1).—Vertical section through the antrum, showing necrosis of its roof with perforation through bone and dura. *A.* indicates antrum; *E.A.C.*, external auditory canal, and *N.*, necrosis of the roof of the antrum and adjacent dura.

of involvement of the mastoid. This type of discharge over so long a period is suggestive of pneumococcus type III infection. Histologically the extensive destructive properties of this organism and its tendency to produce intracranial complications were evidenced by perforation of the dura of the middle fossa and by the diffuse suppuration in the petrosa.

CASE 2.—J. S., a man aged 30, was admitted to the hospital on Oct. 9, 1929, with a history of pain in the left ear, profuse aural discharge for one week and frontal

headache for five days. Physical examination on admission revealed postauricular edema of the soft parts with exquisite tenderness of the mastoid. Mastoidectomy was performed. No perforation through the cortex was found. No free pus was noted. The bone had a peculiar reddish necrotic appearance, extending to and involving the sinal plate. Two days later labyrinthine signs—nystagmus and total loss of hearing—developed. The patient had apparently recovered and after eighteen days was discharged. He felt well except for tinnitus for over two months and experienced severe pain on the left side of the face. On the day before his second admission the headache, which had become intense, was associated with a definite chill, vomiting and unconsciousness. On admission there was clinical evidence of meningitis. The pneumococcus type III was recovered from the spinal fluid.

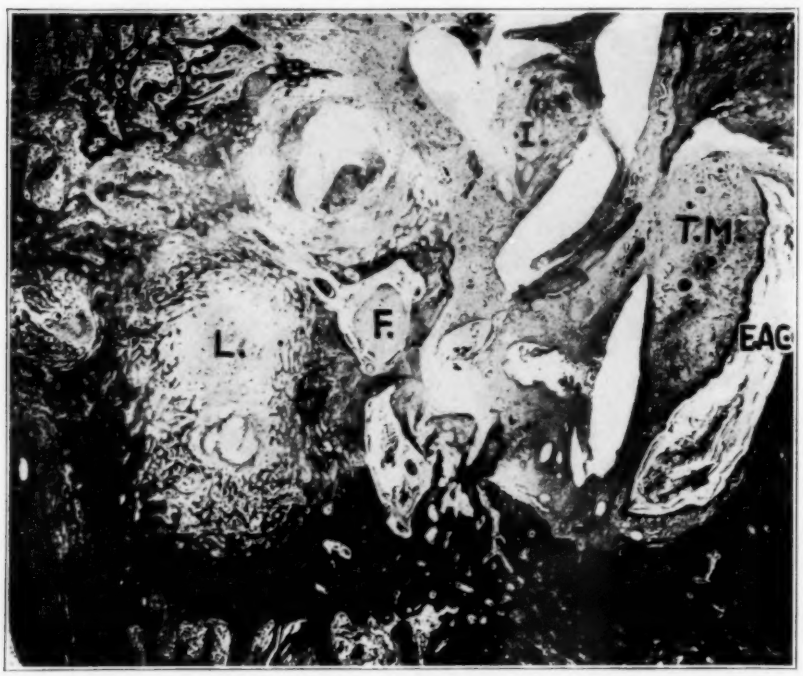

Fig. 3 (case 2).—Section through the tympanum. There is extensive inflammatory reaction within the tympanic cavity. The tympanic membrane is markedly thickened, and there is erosion of the inner tympanic wall. The labyrinthine cavity is almost entirely destroyed and is replaced by fibrous tissue and new formed bone. *E.A.C.* indicates external auditory canal; *F.*, facial nerve; *I.*, incus; *L.*, labyrinth replaced by fibrous tissue and new bone, and *T.M.*, tympanic membrane.

He died on the day of admission. Postmortem examination revealed the presence of diffuse meningitis secondary to a large deep extradural abscess on the posterior aspect of the petrous pyramid, communicating with the internal auditory meatus.

Histologic examination of the temporal bone showed extensive necrosis with osteoclastic resorption and sequestration of the inner table of the mastoid and

the pars petrosa. With this extensive disease there was evidence of adjacent new bone formation. The apex of the petrous pyramid showed marked reactive changes, the bone marrow having undergone fibrosis and metaplasia of bone. The labyrinth was almost entirely destroyed. The membranous parts could no longer be identified. The labyrinthine cavities were replaced by granulation tissue, fibrous tissue and newly formed bone. A large extradural collection of purulent exudate was situated on the posterior aspect of the petrous pyramid, from the region of the saccus endolymphaticus medially to the internal auditory meatus and inferiorly to the jugular bulb. The adjacent dura showed reactive inflammatory changes, and the underlying bone had undergone necrosis. The jugular bulb was the seat of well organized thrombophlebitis.

Comment.—The presence clinically of subperiosteal thickening and edema over the mastoid without evidence of a perforation of the cortex at operation was of interest. In spite of extensive disease of the mastoid, manifested by the reddish necrotic appearance of the bone, there was no purulent exudate. This finding is not infrequent at operation in cases of pneumococcus type III infection.

This case, like the previous one, demonstrated the invading tendencies and insidious nature of the organism under discussion. The patient in the early stages of the disease manifested signs of acute mastoiditis with labyrinthine involvement, from which he apparently recovered. After about three months, during which time he was relatively symptom free, signs and symptoms of frank meningitis set in. Postmortem examination showed extensive suppuration in the petrous pyramid, labyrinthitis in the healing stages, deep extradural abscess, thrombosis of the jugular bulb and meningitis. The point previously made, of the importance of closely observing the patient for at least three months following mastoidectomy, is convincingly illustrated by this case.

CASE 3.—J. K., a woman aged 62, diabetic, complained of pain in the left ear four months before her admission to the hospital, followed by spontaneous perforation of the drum one week later. Three months later she experienced pain behind the ear, and three days before admission, severe pain in the back of the head associated with rigidity of the neck. A fainting spell and chilly sensations set in. The patient was in a semicomatose state for the two days before admission and on admission showed signs of frank meningitis. The left ear showed scant mucoid discharge, which did not pulsate and did not reappear after cleansing. There were no changes in the canal wall and no tenderness over the mastoid. Lumbar puncture revealed the pneumococcus type III on culture. At operation (mastoidectomy) extensive destruction of the bone with sequestration and a huge extradural abscess of the middle fossa were disclosed. The patient died the following day.

Histologic examination of the temporal bone showed evidence of marked inflammatory changes in the bone about the tympanic and mastoid cavities, i. e., osteoclastic resorption with sequestration of bone, the ossicles undergoing necrosis. The tympanic membrane was almost completely resolved (fig. 4). The pars petrosa, particularly the apex, showed little evidence of disease.

Comment.—Interesting features were:

1. A more or less asymptomatic period of four months after acute otitis media in a diabetic patient, followed by fulminating meningitis.

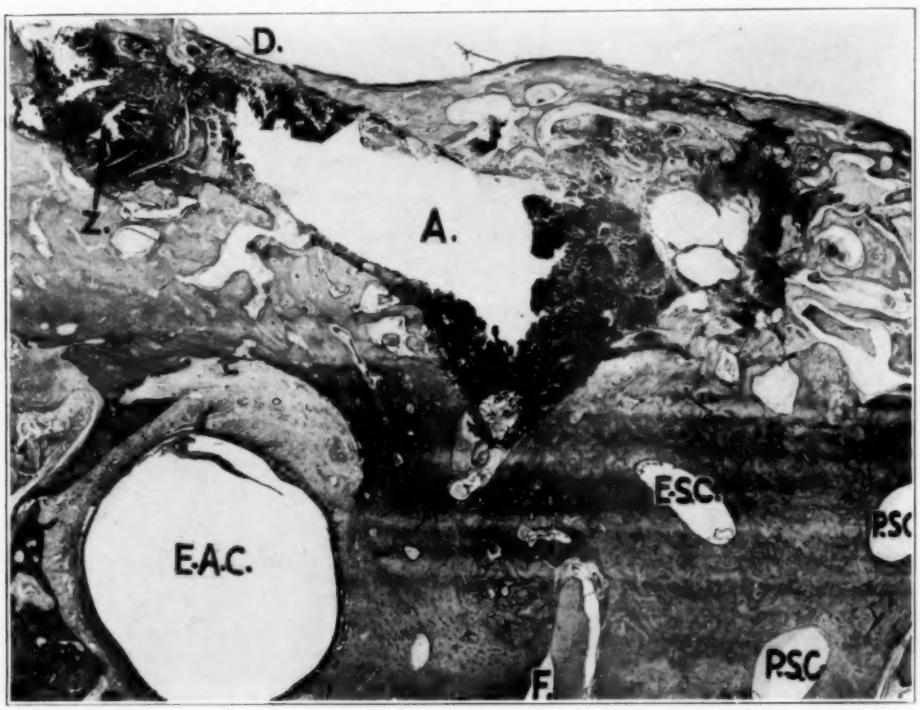

Fig. 4 (case 3).—Vertical section though the antrum, showing marked inflammatory changes within the antrum, zygoma and periantral spaces. There is extension of the inflammatory process to the dura of the middle fossa at *D.* by necrosis. *A.* indicates antrum; *E.A.C.*, external auditory canal; *E.S.C.*, external semicircular canal; *F.*, facial nerve; *P.S.C.*, posterior semicircular canal, and *Z.*, zygoma.

2. The extensive disease of the mastoid encountered at operation, although there were no physical signs. The tympanic membrane was undergoing resolution.

3. In spite of the long duration of the otitis, little evidence of involvement of the petrous pyramid histologically. The meningitis was secondary to disease in the tympanum and mastoid.

ABSTRACTS OF CASES

Twenty-one cases are presented in abstract form to illustrate various characteristic and diagnostic features of pneumococcus type III infection described in this paper:

CASE 4.—A. G., aged 29, aroused suspicion of pneumococcus type III infection because of a mucoid discharge from the middle ear at the end of three weeks, a history of headache and slow pulse. The patient had good hearing. There was evidence of involvement of the mastoid. At operation marked necrosis with a small amount of purulent exudate and a perisinal abscess were found. There were meningeal signs. The pneumococcus type III was recovered from fluid obtained by spinal tap seven days postoperatively. The patient died.

CASE 5.—R. M., aged 66, a diabetic patient, had otitis resembling the influenzal type, but bacteriologic examination of the discharge from the middle ear disclosed the pneumococcus type III. Operation revealed extensive necrosis of the mastoid, encroaching on the petrosa. The patient recovered.

CASE 6.—S. G., aged 42, had pain in the ear and hemicranium for three weeks but at no time had aural discharge. The drum was flat and thickened, but no landmarks could be seen. There was edema over the mastoid, without tenderness. Hearing was good. Operation showed perforation of the bony cortex. The patient recovered.

CASE 7.—L. M., aged 56, apparently had influenzal otitis followed by signs of mastoiditis at the end of three weeks. Operation showed extensive destruction with perisinal abscess. Recovery was uneventful.

CASE 8.—S. P., aged 55, had diabetes and a history of prolonged (two months) aural disease. On admission there were signs of suppurative labyrinthitis and bacterial meningitis. (Material obtained by lumbar puncture showed the pneumococcus type III.)

CASE 9.—U. P., aged 42, had excellent hearing. Aural discharge ceased after four weeks of otitis. Despite this, frank signs and symptoms of acute mastoiditis were present. Operation showed perisinal and epidural abscess. The patient recovered.

CASE 10.—S. R., aged 24, had influenzal otitis. Pneumococcus type III was obtained from material obtained by myringotomy. At the end of three weeks there was evidence of mastoiditis. Operation showed extensive destruction of bone. Culture of material from the mastoids showed Str. haemolyticus. The patient recovered.

CASE 11.—A. S., aged 37, showed signs of mastoiditis, and mastoidectomy was performed. Softening extending in all directions made it difficult to reach the limits of disease. Infection by pneumococcus type III was suspected and verified by culture. The patient recovered.

CASE 12.—A. K., aged 39, had had otalgia for four months without discharge from the ear. On admission good hearing, signs of mastoiditis and sagging of the bony canal wall were present. Epidural and perisinal abscess were found. Although there was no postoperative clinical evidence of thrombophlebitis, a metastatic focus developed in the sternoclavicular joint, from which the pneumococcus type III was obtained. The patient recovered.

CASE 13.—H. C., aged 57, was diabetic. The aural disease followed trauma to the ear, and the course was painless for two months, at the end of which time a

subperiosteal abscess was found over the zygoma, with extensive involvement of the bone over the sinus and dura and little pus. The patient recovered.

CASE 14.—H. R., aged 50, was diabetic. There had been pain in the ear at the onset, followed by an insidious course for four weeks before spontaneous perforation of the drum occurred. A discharge from the middle ear had been present for ten days. Operation revealed extensive destruction with perisinal abscess. The patient recovered.

CASE 15.—L. C., aged 45, had had otalgia for two and one-half months without discharge from the middle ear at any time. On admission the hearing was good; zygomatic swelling and sagging of the canal wall were noted. Mastoidectomy was done, and zygomatic perforation was found. The Wassermann reaction was 4 plus. The patient recovered.

CASE 16.—D. G., aged 49, had had otalgia for three days, followed by an interval of five weeks with no pain. Then spontaneous discharge from the middle ear occurred, with recurrence of pain. Sagging of the bony canal wall was observed. Operation showed extensive destruction. Postoperatively there were transient diplopia and pain in the teeth suggestive of petrositis. A roentgenogram was suggestive of petrous involvement. The patient recovered without further operation.

CASE 17.—A. S., aged 59, had had pain in the right ear for four weeks. The drum was thickened, with radiating blood vessels; there was no discharge from the middle ear. Myringotomy was followed by a thick discharge for one day only and signs of mastoiditis. Operation revealed perforation through the tip of the mastoid and peribulbar abscess. The patient recovered.

CASE 18.—H. H., aged 59, had had pain and discharge from the ear for two weeks, after which the discharge ceased. Two weeks later postauricular swelling appeared and the bony canal was narrowed. No landmarks were visible, and there was no discharge. Operation revealed perforation through the cortex and perisinal abscess. The bone had a peculiar reddish granular appearance. Syphilis was present. The patient recovered.

CASE 19.—A. A., aged 40, experienced spontaneous perforation followed by discharge from the middle ear for two weeks. Postauricular swelling appeared at the end of three weeks. Operation revealed subperiosteal and perisinal abscess. The patient recovered.

CASE 20.—H. Z., aged 40, had had otalgia with a dry middle ear for eleven days. On myringotomy a serous exudate was obtained, culture of which showed Staph. aureus. Signs of mastoiditis developed. Operation revealed sclerosis of the mastoid; thick pus appeared under pressure. The pneumococcus type III was cultured from material from the mastoid.

CASE 21.—C. L., aged 63, was diabetic. Otalgia, ocular pain and temporal headache had been present for one week, followed by spontaneous perforation of the drum. Drowsiness, vomiting and chill were present for four days. There was marked hearing impairment on admission. The discharge from the middle ear was cultured and Str. haemolyticus found. Mastoidectomy and obliteration of the sigmoid sinus revealed perisinal abscess, a necrotic sinus wall and a purulent exudate within the lumen. The sigmoid and the lateral sinus were completely thrombosed. Blood culture showed the pneumococcus type III. The patient died two days postoperatively.

CASE 22.—L. K., aged 30, had bilateral influenzal otitis media with blebs on the drum. A discharge from the middle ear showed the pneumococcus type III. Signs of mastoiditis developed. The patient refused operation.

CASE 23.—J. F., aged 64, had had constant tinnitus for sixteen days after swimming and hemicranial pain for two days. There had been no discharge from the middle ear. The drum was thickened, and no landmarks were visible. Postauricular tenderness was present. Operation revealed a mucoid discharge. The patient recovered.

CASE 24.—A. I., aged 51, had had tinnitus for four months; he was otherwise symptomless. On admission the drum was thickened, and no landmarks were visible. Sagging of the bony cannal was observed. There was no mastoid tenderness. The hearing was impaired. A roentgenogram was suggestive of destruction of bone. Operation revealed extensive destruction and a thin discharge. The patient recovered.

SUMMARY AND CONCLUSION

An analytic study of 73 cases of pneumococcus type III infection of the ear from the standpoint of clinical course, pathology, diagnosis, treatment and outcome is presented.

The cases are classified according to clinical course and otoscopic picture.

Determination of the type of organism in the discharge from the middle ear or the mastoid is of paramount importance. Such bacteriologic investigation is especially important not only with otitic infections presenting a latent or insidious course but with those which clinically resemble streptococcic otitis.

Extensive destruction throughout the temporal bone is a characteristic observation made at operation or on histologic examination. These marked changes are frequently encountered in spite of a latent innocuous clinical course.

Intracranial complications are associated more commonly with otitic infections due to this organism than with those due to the streptococcus. They usually occur late in the disease and only occasionally in the early stages.

The following points in the treatment are stressed:

1. Early paracentesis should be done when infection with the pneumococcus type III is suspected, to establish a diagnosis.

2. Autogenous vaccine should be used as soon as the organism is identified.

3. There should be complete exenteration of all diseased bony structure, with special investigation of various routes into the petrosa. Postoperative evidence of petrositis frequently demands early operative intervention. The recognized surgical procedures combined with administration of sulfapyridine and of serum should be employed.

4. There is no specific therapy for pneumococcus type III meningitis.

5. Prolonged observation of the patient after complete healing of the mastoid is of extreme importance.

SCLEROMA (RHINOSCLEROMA): HISTOLOGIC CHANGES FOLLOWING TELERADIUM THERAPY

REVIEW OF SCLEROMA IN THE UNITED STATES

J. ALLAN WEISS, M.D.
CHICAGO

Scleroma originally was limited in occurrence to central and southeastern Europe, being endemic in Poland, Austria and Russia. Since the World War it has been found with increasing frequency throughout Europe and the rest of the world. In recent years many cases have been observed in South America, Mexico and Central America, particularly in El Salvador and Guatemala.

A thorough survey of the American literature reveals 58 cases in the United States during the forty-five years since the first report.[1] The great majority of the patients were immigrants. It is interesting to note, however, that 8 patients were native born. Although the latter group were mainly of foreign parentage, only 1 had been outside the country (table). These cases support Chamberlin's recent speculation regarding the possibility of scleroma's becoming indigenous in the United States. Furthermore, as he has pointed out, because of the increased facilities for worldwide travel and transportation, diseases rarely remain confined to any one country or clime but are soon disseminated to other regions of the globe where conditions may be favorable to their development. These two factors make it advisable for otolaryngologists to bear in mind the increasing incidence of scleroma when considering chronic lesions of the upper air passages.

This paper will give a résumé of the essential information pertaining to scleroma, report 2 cases in which teleradium therapy plus surgical intervention was effective and describe the changes in the histologic picture of a lesion after regression under radium treatment.

HISTORY

Scleroma is defined as chronic specific granuloma, characterized by an extremely indolent clinical course, a distinctive microscopic structure and probable transmission by infection.

Read as a candidate's thesis for the Chicago Laryngological and Otological Society, Dec. 5, 1938.

1. A list of case reports published in the United States is appended at the end of this paper.

The first clinical description was given by von Hebra [2] in 1870. Mikulicz [3] in 1876 noted its unique histologic appearance. In 1882 von Frisch [4] isolated Bacillus rhinoscleromatis.

There is a divergence of opinion among various authorities on a number of points regarding scleroma. The following data are derived

Cases of Scleroma in Native Americans

Author and Year	Patient: Sex	Patient: Age, Yr.	Nativity	Location of Lesion	Treatment	Result	Comment
Wende 1895	M	11	Buffalo	Right naris and nasopharynx	Chemical cauterization	No improvement	First case of a native born American reported
Lieberthal 1911	F	26	United States (family in United States "for generations")	Naris, lip and pharynx	Roentgen irradiation	Improvement	Culture positive for Frisch bacilli; no microscopic examination of lesion
Watkins 1921	M	23	United States (Negro; frequent visitor to Central America)	Trachea	Oral administration of potassium iodide; mercurial inunctions	Death from asphyxia	Preliminary diagnosis of laryngeal syphilis
Wood 1925	M	24	New Jersey	Nose, pharynx and larynx	Intravenous injections of antimony and potassium tartrate; roentgen irradiation	Improvement	Patient later treated by Figi and Thompson by tracheotomy and with radium
Canfield 1933	F	17	Michigan	Nose, larynx and trachea	Autogenous vaccine therapy; tracheotomy; intensive high voltage roentgen irradiation	Marked improvement	Nasal lesions resolved; tracheotomy tube removed after one week
Helwig and Jaime 1933	M	20	Kansas (Mexican descent; never out of the state)	Larynx	Intravenous injections of sodium iodide	Death from asphyxia	Diagnosis of laryngeal syphilis
Stout 1934	M	25	United States	No lesion; nasal crusting and discharge	Autogenous vaccine therapy; roentgen irradiation	Improvement	Culture positive for Frisch bacilli; "probable case" (Stout)
Alderson 1937	F	29	California	Nose, lip and hard palate	Heavy low and high voltage roentgen irradiation	Moderate improvement	Numerous Mexicans in the district

largely from the conclusions of a symposium at the Second International Congress of Otorhinolaryngology, held in Madrid, Spain, in 1932.[5] At this meeting the name scleroma was officially adopted as a more inclusive designation than the original term, rhinoscleroma.

2. von Hebra, R.: Rhinosklerom, Wien. med. Presse **11**:445, 1870.

3. Mikulicz, J.: Ueber das Rhinosklerom, Arch. f. klin. Chir. **20**:485, 1876.

4. von Frisch, A.: Zur Aetiologie des Rhinosklerom, Wien. med. Wchnschr. **32**:969, 1882.

(Footnotes continued on next page)

PATHOGENESIS

Scleroma usually starts in early adult life, though it has been found in children. Ninety-five per cent of the occurrences are in laborers or peasants. The incidence in women is about 58 per cent. Dietary insufficiency, personal uncleanliness and, possibly, some unknown constitutional condition may be predisposing factors. The disease is considered infectious. Its contagiousness is not fully established, despite reports of multiple occurrences in the same family.

CAUSATION

Frisch's organism, B. rhinoscleromatis, is constantly found in typical lesions as a short, gram-negative, encapsulated bacillus, either single or paired. It has been accepted by many as the causative organism of the disease. Transmission to animals has been accomplished. However, attempts at experimental production of the disease in man have failed, despite inoculation, nasal tamponage and even subcutaneous implantation of tissue excised from granulations.

Hajek expressed a doubt of the identity and specificity of the Frisch bacillus, on the ground that cultural and morphologic characteristics do not separate it absolutely from other encapsulated organisms found in the nose. Also, he maintained that Koch's postulates have not been fulfilled.

On the other hand, Goldzieher and Neuber showed that serologic reactions, including complement fixation and agglutination, confirm the specificity of the organism.

According to Streit, present knowledge indicates that scleroma is an infectious disease, and the causative organism, in all probability, is the bacillus of Frisch.

GROSS PATHOLOGIC PICTURE

Scleroma involves the upper respiratory tract. The lesions are bilateral, usually starting in the nose. It may remain limited to that structure or progressively extend to the nasopharynx, soft palate, uvula, faucial pillars, larynx and trachea. Less often extension occurs to the upper

---

5. Hajek, M.: History of Scleroma, Arch. Otolaryng. **18**:392 (Sept.) 1933. Streit, H.: Etiology of Scleroma, ibid. **18**:392 (Sept.) 1933. Szmurlo, A.: Anatomicopathology of Scleroma, ibid. **18**:393 (Sept.) 1933. Šercer, A.: Experimental Pathology of Scleroma, ibid. **18**:395 (Sept.) 1933. Putschkowsky, A.: Significance of War in the Spread of Scleroma of the Upper Respiratory Passages, ibid. **18**:396 (Sept.) 1933. Burraud: International Legislation on Scleroma, ibid. **18**:396 (Sept.) 1933. Lasagna, D. F.: Bacteriology of Scleroma, ibid. **18**:396 (Sept.) 1933. Burak: Treatment of Scleroma, ibid. **18**:397 (Sept.) 1933. Neuber, E.: Serology and Allergy of Scleroma, ibid. **18**:397 (Sept.) 1933. Belinoff: Epidemiology of Scleroma, ibid. **18**:398 (Sept.) 1933.

lip, tongue, eustachian tube, orbit, lacrimal apparatus or bronchi. Primary laryngotracheal lesions are not uncommon. Frequently more than one area is involved. In the 2,631 cases registered by the International Committee for the Study of Scleroma, the following distribution was found: nose, 60 per cent; larynx, 60 per cent; nasopharynx, 28 per cent; pharynx, 16 per cent; trachea and bronchi, 9 per cent, and other sites, 5 per cent.

Systemic invasion does not occur. The lesions rarely ulcerate. Bone, cartilage and lymph glands are not affected.

Szmurlo described three stages of the disease:

First, the diffuse stage, in which it resembles atrophic rhinitis and is marked by crusting, a thin foul nasal discharge and redness and infiltration of the mucosa.

Second, the circumscribed stage, in which numerous small bluish red edematous nodules are present, slowly coalescing into firm granular cartilaginous masses.

Third, the cicatricial stage, in which dense gray atrophic scars occur, with resultant deforming adhesions of the soft structures and progressive concentric stenosis of the involved portion of the air passages.

SYMPTOMS

The symptoms largely depend on functional impairment of the area involved. The onset is insidious; there is no pain. The course is extremely indolent, extending to twenty or thirty years. There is no effect on the general health.

In nasal lesions, crusting, epistaxis and foul discharge occur early. Gradual occlusion of the nares subsequently leads to impairment of breathing.

Pharyngeal involvement is marked by dysphagia and difficulty in speech. Laryngeal and tracheal lesions are indicated by hoarseness, cough and dyspnea gradually progressing to asphyxia.

DIAGNOSIS

Scleroma is recognized by its more frequent occurrence in the foreign born, by the great chronicity of its course, by the hardness of the lesions, by the absence of pain, ulceration or systemic involvement and by the eventual cicatricial deformities with stenosis.

In earlier stages isolation of Frisch's organism and positive serologic reactions are of great value. Specific complement fixation is present in 92.5 per cent of the cases.[6]

---

6. Belinoff, S.: Der jetzige Stand des Skleromfrage, Zentralbl. f. Hals-, Nasen- u. Ohrenh. **26**:193, 1936. This article contains a bibliography of sixty-four articles.

An intracutaneous reaction similar to the Mantoux reaction in tuberculosis frequently occurs.

The histologic appearance is constant.

The first stage of scleroma must be distinguished from atrophic rhinitis. In the later stages, papilloma durum and various granulomas, including those due to syphilis, lupus vulgaris, leprosy, sarcoid (Boeck), carcinoma and sarcoma, must be differentiated. Laryngeal lesions frequently have been mistaken for those of syphilis.

TREATMENT

No single method of management is uniformly successful in the control of scleroma. Oral medication, intravenous chemotherapy, local application of caustics, electrocoagulation, foreign protein therapy, intubation, autohemotherapy, bougienage and surgical intervention, per se, have proved futile or only partially beneficial.[5]

Much more favorable results have been obtained since the advent of irradiation. Roentgen rays were first used abroad by Gottstein (1902), Fittig (1903) and Ranzi (1904) and in this country by Pollitzer (1906) and Ballin (1906). Kruglikowa [7] recently reported gratifying effects from treatment with roentgen rays after cauterization with solid carbon dioxide.

Radium was employed for scleroma first by Eicken [8] and by Trozel [8] and later by Kahler (1905). In this country an early report was made by Guttman, in 1915.

Burak expressed disbelief that the benefit from any method of treatment is permanent. In a large series of cases he advantageously employed tracheostomy and laryngostomy in conjunction with radical excision of obstructive infiltrations. However, he found that late scarring interfered with the initial excellent results.

Neuber has had success with autogenous vaccine, fortified by intravenous gold therapy. He asserted the conviction that specific vaccinotherapy will be the method of choice in the future.

Most authorities agree that the best results in scleroma follow combined therapy, with a judicious choice of irradiation, electrocoagulation, essential surgical procedures or vaccinotherapy according to the site of the disease.

PROGNOSIS

The prognosis of scleroma varies with the stage of the disease and the extent of the involvement. At times the lesions may end spontaneously by cicatrization. Early lesions, especially those limited to the

---

7. Kruglikowa, R. K.: Zur Röntgentherapie des Skleroms der oberen Luftwege, Strahlentherapie **50**:333, 1934.

8. Cited by Kruglikowa.[7]

nose and nasopharynx, may be arrested completely by adequate management. Stenotic lesions in the larynx and trachea pursue a less favorable course.

REPORT OF CASES

CASE 1.—M. J., a woman aged 53, was born in Mexico and had lived in Kansas City, Kan., since 1910. About 1915 her left nostril began to close, and it was almost completely blocked by 1920. It was then operated on but again slowly closed over a period of years. Early in the course there was excessive secretion. There was no pain at any time. In 1927 she was aware that her right nostril also was obstructed. Nasal breathing gradually became more difficult. She came under my care in February 1936 at the Illinois Eye and Ear Infirmary. At that time little air could enter the nose. There were no other complaints.

The tonsils were atrophic. There were no changes in the uvula, faucial pillars, soft palate or pharyngeal wall. The nasal septum was slightly subluxated to the left. The floor of the vestibule on the right side was considerably elevated. The mucosa of the septum was thickened and infiltrated by a mass of hard grayish red granulation tissue, about 1.5 by 2.5 cm., constricting the nasal aperture to 3 mm. in diameter. This new tissue had a dry, rough, granular surface. There was no excessive secretion, bleeding or ulceration. The alar cartilage was not involved.

The left naris was reduced to 5 mm. in diameter by a similar elevation of the floor and by the adherence of the lateral wall to the septum in a dense gray scar. The mucosa visible beyond was smooth and dull red.

The nasopharynx, larynx and subglottic area of the trachea were not altered.

A general medical examination revealed nothing noteworthy. The blood pressure was 110 systolic and 80 diastolic. The temperature was normal. Urinalysis gave negative results. The red blood cell count was 4,200,000, the hemoglobin concentration 75 per cent and the white blood cell count 8,500, with 55 per cent polymorphonuclear neutrophils, 41 per cent lymphocytes, 3 per cent mononuclears and 1 per cent eosinophils. The Wassermann reaction of the blood was negative.

Scleroma was suspected on the basis of the nativity of the patient, the extremely indolent clinical course, the recurrence after surgical excision and the appearance of the lesion. This provisional diagnosis was confirmed by biopsy. As the section was characteristic, culture of the tissue or nasal secretion was not carried out. The mass in the right naris was considered an active infiltration. The stenosis of the left naris was due to a firm, atrophic scar.

Teleradium therapy was decided on. The patient was referred to the tumor clinic of the Michael Reese Hospital. From March 19 to April 7 a series of eight exposures to the 2 Gm. radium pack was given through a 5 cm. portal at a distance of 6 cm. with 1 mm. of platinum filtration, for a total of 16,000 milligram hours of radiation. By May 12 the mass in the right nostril had resolved to one-half its original size. Between May 14 and May 26 the patient again received 16,000 milligram hours, in a second series of eight exposures. The total radiation given was 32,000 milligram hours.

By June 23, three months after the beginning of therapy, the lesion had entirely regressed. In the next four months the opening of the right nostril enlarged from 3 to 6 mm. in diameter, permitting a view of normal intranasal structures. The aperture of the left nostril was now 1.2 cm. in diameter, compared with 5 mm. before treatment. The constricted scars on both sides were pink, soft and pliable in contrast to their formed density.

On November 5 each cicatrix was incised to the floor of the nasal vestibule. The cut edges were separated by thin plates of dental wax. Healing followed rapidly without recurrence of the adhesions. The nares were restored to about their normal dimensions.

Tissue was removed for histologic study in August 1937. At the last inspection, in November 1938, two and one-half years after completion of irradiation, both nostrils were fully patent and entirely free from disease.

CASE 2.—E. M., a woman aged 60, was born in Poland and had been in the United States for fifteen years. In March 1937 she was seen by Dr. Bruno Blumklotz in the nose and throat clinic of the Michael Reese Hospital. The only complaint was of headache. Examination disclosed evidence of low grade ethmoiditis. The larynx and pharynx were normal. A grayish red nodule about 1 cm. in diameter was attached to the right inferior turbinate. There was little obstruction to breathing. The Wassermann reaction of the blood was negative.

The mass was removed with a snare. Examination revealed the typical microscopic structure of scleroma. Culture of tissue from the base of the nodule yielded B. rhinoscleromatis (Klebsiella rhinoscleromatis).

The patient was referred to me for further management. Although inspection showed no gross evidence of the lesion except roughness of the mucosa, radiation was decided on as a means of prophylaxis against recurrence, which commonly follows surgical excision. In October 20,000 milligram hours was administered with the 2 Gm. radium pack. No recurrence could be seen at the last examination in October 1938, one year after treatment.

MICROSCOPIC CHANGES BEFORE AND AFTER IRRADIATION

Two distinct entities in the microscopic picture of scleroma are the large vacuolated Mikulicz cells and the deeply staining, homogeneous hyaline masses (Unna's bodies, Russell's bodies) (fig. 1). As the former cells are present also in glanders and leprosy, the histologic structure is not deemed pathognomonic. However, it is constantly seen and is characteristic enough to establish the diagnosis when combined with the clinical findings.

The epithelium is many layered and pseudostratified, with considerable hyperplasia and hydropic degeneration. The submucosa consists of a thin reticulum of connective and elastic tissue, thickly infiltrated with large and small lymphocytes, monocytes, eosinophils, endothelial cells and plasma cells in all stages of degeneration. The typical Mikulicz foam, or "bubble," cells, considered to originate from degenerated plasma cells or mononuclear cells, are numerous and prominent. These cells vary from ten to fifteen times the diameter of a red blood corpuscle. They have an eccentric, pyknotic nucleus and a poorly staining cytoplasm, with vacuoles and numerous minute granules. The short, gram-negative, encapsulated diplobacilli of Frisch can be shown within these cells by special stains, such as Giemsa (fig. 2). The arrangement of the foam cells in clusters produces the typical "lacelike" appearance seen under low power magnification. The hyaline elements, deeply

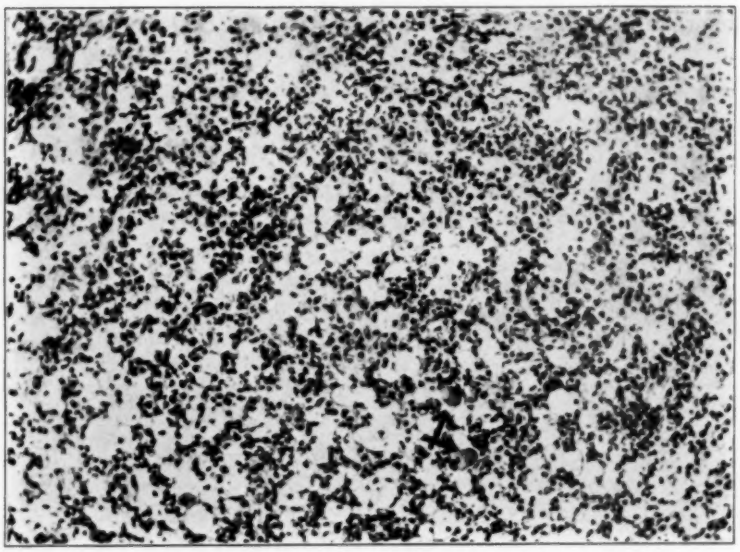

Fig. 1 (case 1).—"Lacelike" structure of scleroma before irradiation, hemotoxylin and eosin stain, × 160. Note the numerous vacuolated Mikulicz foam cells interspersed with plasma cells, endothelial cells, lymphocytes and monocytes. Arrows indicate two nucleated hyaline masses (Russell bodies).

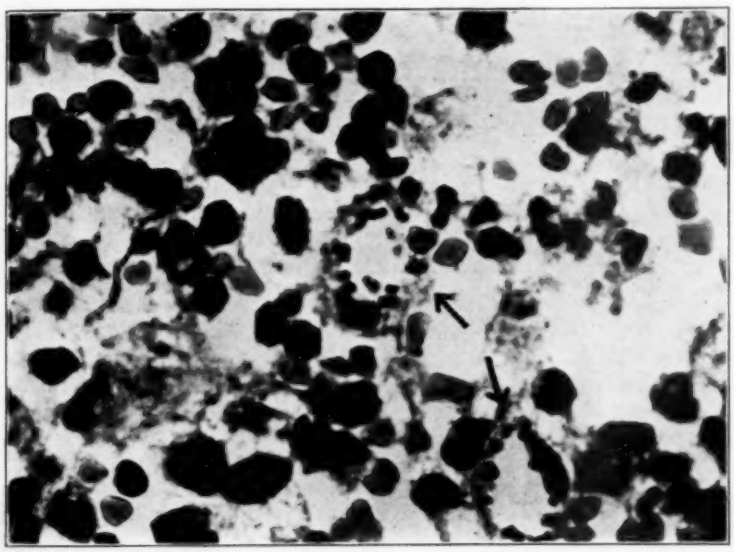

Fig. 2 (case 1).—Area from figure 1, Giemsa stain, × 800. Arrows indicate two Mikulicz cells containing the diplobacilli of Frisch.

staining with eosin, occur as nucleated or homogenous bodies, about 20 to 40 microns in diameter. The capillaries are numerous and usually dilated.

Examination of tissue removed from the site of the lesion fifteen months after irradiation disclosed a replacement of the previous "lace-like" structure by fibrous connective tissue interspersed with smaller areas of cellular infiltration. The squamous epithelium is somewhat hyperkeratinized. There is considerable disintegration of the Mikulicz

Fig. 3 (case 1).—Section from the site of the lesion fifteen months after treatment with 32,000 milligram hours of teleradiation, hematoxylin and eosin stain, × 180. Note the marked fibrosis, increased hyalinization and disintegration and disappearance of the Mikulicz cells.

cells except for some shadowy outlines, difficult to identify with any certainty. The remaining cells consist of poorly preserved lymphocytes and plasma cells. There is also an increased number of small endothelial cells. In the intercellular spaces are a few masses of light brown pigment and some hyaline bodies. In areas the connective tissue is of the adult type with moderate hyalinization. Many of the capillaries are occluded.

The essential changes following irradiation may be summarized as extensive fibrosis, increased hyalinization and a considerable decrease in the cellular content of the stroma, with notable disintegration and almost complete disappearance of the Mikulicz cells.

COMMENT

Irradiation of scleroma effects regression by inducing fibrosis, thus hastening the end stage, contracting scar.

There are varying reports regarding the fate of the bacilli after irradiation. Kruglikowa reported no bactericidal effect; Nemenov considered growth to be inhibited; Schrotter presumed the formation of a latent state. According to these concepts, irradiation merely arrests the progress of scleromatous lesions, and recurrence in one or two years requires repetition of the treatment. This has not occurred in my cases.

The doses of radium reported have varied considerably. MacKee gave 75 milligram hours of direct application and repeated the dose in three months; E. Mayer employed 1,900 milligram hours. Figi and Thompson gave 3,000 to 4,000 milligram hours of external radiation at a distance of 2.5 cm. with 2 mm. of lead screening on four occasions at intervals of five to twelve weeks. In addition 50 to 150 milligram hours was directly applied in unscreened brass tubes in the same case. They reported 1 five year cure and 2 one year cures. Ireland used a 4 Gm. radium pack to give 2,500 roentgens to a nasal area and 3,612 to the larynx of a patient over a period of eight days. The nasal lesion regressed entirely, but the laryngeal condition was not improved.

The technic described in the last two reports is comparable to that used in the cases herein reported. The amount of radiation administered is a factor determining the result obtained. Doses of the order available by teleradium therapy are adequate to eradicate circumscribed scleromatous lesions with slight possibility of recurrence.

SUMMARY

Two cases of nasal scleroma (rhinoscleroma) are reported. In the first case distance irradiation with a dose of 32,000 milligram hours effected complete regression of the lesion. Subsequent surgical correction of the stenosis of the nares was required. There has been no recurrence in two and one-half years. In the second case excision of a small nodule was followed by prophylactic irradiation with a dose of 20,000 milligram hours. One year has elapsed without recurrence of the lesion.

Fifty-eight cases of scleroma have been reported in the United States. Eight of these involved native Americans. In 7 of these the diagnosis was positive; in 1 it was probable.

The histologic changes in scleroma following intensive irradiation include (*a*) extensive fibrosis, (*b*) increased hyalinization, (*c*) decreased cellular content of the stroma and (*d*) disintegration and disappearance of the Mikulicz cells.

Teleradium therapy with higher doses will eradicate circumscribed scleromatous lesions and in all probability prevent recurrences.

NOTE.—Since this paper was prepared 4 additional cases of foreign-born patients have been reported, 3 by Morrison and 1 by Gadomski. The articles have been added to the list of case reports.

25 East Washington Street.

CASE REPORTS PUBLISHED IN THE UNITED STATES

Cases of Immigrants

Jackson, G. T.: A Case of Rhinoscleroma, J. Cutan. & Genito-Urin. Dis. **11**: 381, 1893.

Pollitzer, S., in Morrow, P. A.: A System of Genito-Urinary Diseases, Syphilology and Dermatology, New York, D. Appleton and Company, 1894, p. 516.

Freudenthal, W.: Rhinoscleroma, New York M. J. **63**:133, 1896.

Freeman, W. J.: A Case of Rhinoscleroma, Ann. Otol., Rhin. & Laryng. **9**: 141, 1900.

Danziger, E.: Two Cases of Rhinoscleroma, Laryngoscope **15**:935, 1905.

Toeplitz, M., and Kreuder, H.: Rhinoscleroma, Am. J. M. Sc. **130**:81, 1905.

Ballin, M. J.: A Case of Rhinoscleroma Treated with X-Rays, Laryngoscope **16**:962, 1906.

Pollitzer, S.: A Case of Rhinoscleroma, Laryngoscope **16**:963, 1906.

Stubbs, F. G.: A Case of Rhinoscleroma, Laryngoscope **17**:399, 1907.

Mayer, E.: Rhinoscleroma, Laryngoscope **17**:957, 1907.

Perkins, R. G.: Relation of Bacillus Mucous Capsulatus Group to Rhinoscleroma, J. Infect. Dis. **4**:51, 1907.

Mayer, E.: Rhinoscleroma in North America, Laryngoscope **18**:964, 1908.

Freedburg, S.: Rhinoscleroma, Illinois M. J. **14**:267, 1908.

Gottheil, W. S.: Rhinoscleroma, Internat. Clin. **2**:244, 1908.

Guntzer, J. H.: Scleroma of the Upper Respiratory Tract, M. Rec. **76**:129, 1909.

Kenyon, E. L.: Report of a Case of Rhinoscleroma, Laryngoscope **19**:225, 1909.

Braun, A.: A Case of Rhinoscleroma, Laryngoscope **20**:124, 1910.

Pollitzer, A.: Rhinoscleroma Cured by X-Ray Treatment, J. Cutan. Dis. **28**: 388, 1910.

Durkee, J. W.: Another Case of Scleroma of the Upper Air Passage, Laryngoscope **20**:1132, 1910.

Thro, W. C.: The Bacillus of Rhinoscleroma, Proc. New York Path. Soc. **10**: 96, 1910.

Smith, H.: Rhinoscleroma, J. Cutan. Dis. **30**:100, 1912.

Iglauer, S.: A Case of Scleroma, Tr. Am. Laryng., Rhin. & Otol. Soc. **18**:443, 1912.

Kaempfer, L. G.: Salvarsan in Rhinoscleroma, New York M. J. **99**:636, 1914.

Alderson, H. E.: A Case of Rhinoscleroma, J. Cutan. Dis. **32**:308, 1914.

Holinger, J.: Rhinoscleroma, Illinois M. J. **27**:402, 1915.

Guttman, J.: Radium in Rhinoscleroma, New York M. J. **102**:711, 1915.
Gottheil, W. S.: Rhinoscleroma, J. Cutan. Dis. **35**:269, 1917.
MacKee, G. M., and Wise, F.: Rhinoscleroma, J. Cutan. Dis. **35**:190, 1917.
Bailey, C. H.: Serologic Reactions in a Case of Rhinoscleroma, J. Cutan. Dis. **37**:447, 1919.
Figi, F. A., and Thompson, L.: Rhinoscleroma, J. A. M. A. **91**:637 (Sept. 1) 1928.
Crowe, S. M.: Rhinoscleroma of the Larynx and Pharynx in Two Immigrants, Arch. Path. **5**:1125 (June) 1928.
Lewis, E. R.: Two Cases of Rhinoscleroma, Tr. Am. Laryng., Rhin. & Otol. Soc. **38**:459, 1932.
Alderson, H. E.: Scleroma: Report of a Case, Arch. Dermat. & Syph. **26**:639 (Oct.) 1932.
Bingham, E. M., and Cutler, O. I.: Rhinoscleroma, California & West. Med. **42**:463, 1935.
Schwartz, A. A.: Rhinoscleroma: Report of Two Cases, Arch. Otolaryng. **21**: 199 (Feb.) 1935.
Chamberlin, W. B.: Rhinoscleroma: Is It an Indigenous Disease? Arch. Otolaryng. **23**:285 (March) 1936.
Ireland, E. P.: Rhinoscleroma, with Report of a Case (Canadian Case), Canad. M. A. J. **34**:149, 1936.
Morrison, L. F.: Scleroma (Rhinoscleroma): Report of Three Cases, Arch. Otolaryng. **28**:531 (Oct.) 1938.
Gadomski, C. F.: Rhinoscleroma: Report of a Case, Arch. Otolaryng. **29**:681 (April) 1939.

Cases of Native-Born Americans

Wende, G. W.: A Case of Rhinoscleroma Originating in the United States, Buffalo M. J. **35**:642, 1895.
Lieberthal, D.: Rhinoscleroma, J. Cutan. Dis. **29**:638, 1911.
Watkins, S. S.: Primary Scleroma of the Larynx in a Negro Born in Maryland, Surg., Gynec. & Obst. **33**:47, 1921.
Wood, G. B.: A Case of Rhinoscleroma in an American-Born Patient, Tr. Am. Laryng. A. **47**:87, 1925.
Canfield, N.: Case of Rhinoscleroma in a Native Born American, Ann. Otol., Rhin. & Laryng. **42**:903, 1933.
Helwig, F. C., and Jaime, N.: Laryngeal Scleroma in a Native Missourian: Report of a Case, Arch. Otolaryng. **18**:310 (Sept.) 1933.
Stout, P. S.: Rhinoscleroma: Report of a Probable Case, Laryngoscope **44**: 142, 1934.
Alderson, H. E.: Rhinoscleroma: Report of a Case, Arch. Dermat. & Syph. **36**: 1018 (Nov.) 1937.

LABYRINTHINE FISTULAS

REPORT OF EXPERIMENTS ON THE VITAL RESPONSE TO VARIOUS METHODS OF PRODUCING DEFECTS IN BONE

NORTON CANFIELD, M.D.
NEW HAVEN, CONN.

The literature is replete with references to labyrinthine fistulas occurring during or after chronic suppurations of the temporal bones. Infectious osteitis of the labyrinth produces certain symptoms, which often disappear when the infection subsides. Nylén [1] in 1923, in an exhaustive treatise on the subject, recounted the symptoms presented in some 160 cases. An extensive bibliography accompanied this paper, which on perusal and investigation reveals such a variety of possibilities which may exist with labyrinthine fistulas that adequate explanation for the various symptoms is not as yet possible. Recent work of Dohlman [2] has added even more information to labyrinthine function and necessitates revaluation of the present concepts of the physiology of the labyrinth. Reports of experimental research with labyrinthine fistulas were confined to the effects produced on the function of this organ, but few remarks were made about cochlear function. Of possible importance, however, for the problem of fistulization of the otic capsule for defective hearing is the careful observation of the fistulas made with the dissecting microscope magnifying to nine diameters. Holmgren, Bárány and Nylén have made observations with this instrument and contributed the fact that it can be used for actual operation on the labyrinth. A report of this work was presented in Holmgren's paper in 1922.[3] The Gullstrand glasses were described, and the limitation of the technic was designated.

Experimental work done with the help of the Clinical Research and Teaching Fund of the Yale University School of Medicine.

Presented to the Section on Otolaryngology of the College of Physicians of Philadelphia and the Philadelphia Laryngological Society, Dec. 13, 1938.

1. Nylén, C. O.: A Clinical Study of the Labyrinthine Fistula Symptoms and the Pseudo-Fistula Symptoms in Otitis, Acta oto-laryng., 1923, supp. 3.

2. Dohlman, G.: On the Mechanism of Transformation into Nystagmus on Stimulation of the Semi-Circular Canals, Acta oto-laryng. **26**:425 (Sept.-Oct.) 1938.

3. Holmgren, G.: Operations on the Temporal Bone Carried Out with the Help of the Lens and the Microscope, Acta oto-laryng. **4**:383, 1922.

In the years 1890 to 1914 many reports came from the otologists of Europe concerning attempts to mobilize or remove the stapes after ankylosis produced either by chronic otitis or by otosclerosis. Passow [4] suggested a supplementary hole in the otic capsule and reported in 1897 at the German Otologic Society a case of partial deafness following otitis media. "A hole was made with a drill beside the foot plate, at first with striking results." Tinnitus disappeared, and hearing improved. Later hearing was diminished. Passow performed the same operation a second time, with only temporary improvement in hearing.

Floderus [5] in 1899 reported the possibility of producing "sound fistulas" in the otic capsule. In 1906 Matté [6] reported a case of fistulization of the optic capsule by a transtympanic route through the promontory. Hearing improved but became worse after a short while.

In 1922 Fremel [7] reported a case in which Bárány had operated in 1914. The posterior semicircular canal was opened. Improvement in hearing was satisfactory but transient. Bondy [8] discussed the report and stated that he had also helped Bárány at such an operation which produced an indifferent result. Bondy objected to the procedure on the ground that the orifice did not remain open.

In 1923 Holmgren [9] reported 4 cases of otosclerosis in which operation was performed with the aid of the microscope, the fistula being made through the promontory. Improvement in hearing remained in 3 cases for five, eight and eleven months. In 1 case there was no improvement.

Sourdille [10] has reported operations on over 100 patients. He has reported reopening some of the fistulas by removing the regenerated bone which formed after the first fistula was made.

---

4. Passow, in discussion on Panse, R.: Stapesankylose, Verhandl. d. deutsch. otol. Gesellsch. **6**:141, 1897.

5. Floderus, B.: Contribution to Radical Surgical Therapy of Stapes Ankylosis, Nord. med. Ark. **10**:1, 1899.

6. Matté: Labyrinthtrepanation und Auskratzung des Vorhofs wegen qualvoller Geräusche bei sogenannter Mittelohrsklerose, Otospongiose, Deutsche med. Wchnschr. **32**:841, 1906.

7. Fremel, F.: Demonstration eines wegen Otosclerose vor 8 Jahren operierten Patienten, Monatschr. f. Ohrenh. **56**:552, 1922.

8. Bondy, cited by Duel, A. B.: Otosclerosis: A Résumé of the Literature to July 1928, Compiled Under the Direction of the Committee on Otosclerosis of the American Otological Society, New York, Paul B. Hoeber, Inc., 1929, vol. 2, p. 580.

9. Holmgren, G.: Some Experiences in the Surgery of Otosclerosis, Acta oto-laryng. **5**:460, 1923.

10. Sourdille, M.: New Technique in the Surgical Treatment of Severe and Progressive Deafness from Otosclerosis, Laryngoscope **47**:853 (Dec.) 1937.

Holmgren's work in a large series, over 100 cases, has now been reported in considerable detail.[11] He has explained the various methods which he used in attempting to produce and maintain hearing.

I now consider that the problem is in a phase where precise laboratory experimental work will be important. The principle of fistulization and the risk involved from the surgical attack are now clear. Each operator will change the technic to suit his own ideas, but a satisfactory method of producing a high percentage of successes remains to be determined. From the physiologic point of view the reason for the improvement of hearing has not been adequately stated. The testing of hearing leaves something to be desired, but with such fundamental work as has been recently reported by Bárány,[12] there now seems to be a satisfactory method for precisely locating the lesion in human beings whose hearing function is diminished. Working on the principle of von Békésy, Bárány has made an apparatus for a more thorough investigation of bone conduction.

Experimental work on the labyrinthine capsule bone in conjunction with clinical application has been the subject of much consideration by Holmgren. Some of this work which has come to my attention may be of interest. The fact that cholesteatomas will keep fistulas open for years is an intriguing possibility. Is it pressure? Is it infection? Is it a stimulation of bone activity to line the fistula with squamous epithelium? Can cholesteatomas be produced by surgical means (a traumatic cholesteatoma was reported by Kelemen [13] in 1934)? Attempts to answer these questions resulted in some interesting procedures.

The following remarks cannot be considered in any way to be a report of these experiments. They were conceived, planned and executed by Professor Holmgren [11] and his associates in his laboratory at Stockholm, Sweden. I wish only to describe the type of work which is being done and refer to the more complete reports which have been published. Brief mention of them is all that is possible.

Application of Thiersch skin grafts to fistulas of monkeys was followed by prompt regeneration of the bone and closure of the fistulas, as determined by microscopically controlled serial sections.

---

11. Holmgren, G.: The Surgery of Otosclerosis, in Nelson Loose-Leaf Living Surgery, New York, Thomas Nelson & Sons, 1938.

12. Bárány, E.: A Contribution to the Physiology of Bone Conduction, Acta oto-laryng., 1938, supp. 26.

13. Kelemen, G.: Traumatische Cholesteatomgenese, Acta oto-laryng. **20**:211, 1934.

Parietal and visceral autogenous peritoneal grafts laid in carefully with the peritoneal surface, and with the fibrous surface against the fistula, have been placed. The mesentery was used with epithelium on both sides. A study of these bones four to six weeks after the operation also showed evidence of rapid regeneration.

If the cholesteatoma acts as a foreign body causing pressure on the labyrinth, foreign bodies to provide similar pressure may be effective. To test this method, pieces of rubber under pressure were inserted, but the same type of failure resulted.

Experiments based on the work of Ménégaux and Odiette,[14] who established an experimental method of studying bone cells in tissue culture, showed the reason for nonhealing in certain cases of fracture to be inherent in some reaction which occurred when metals were in contact with bone. This was considered to be a hydrolytic reaction which prevented healing of bone. With this as a basis various metals have been placed on fistulas with the hope of interfering with regeneration. Results so far have not been conclusive.

A different approach was then considered, and search was made for some other principle which interferes with cell growth in general. Radiant energy was considered, and an associate of Professors Sievert and Albohm, of Radiumhemmet in Stockholm, Sweden, made a preparation for experimental use. It consisted of a small pear-shaped stainless steel capsule in which was placed a minute amount of radium element. This capsule was placed on a labyrinthine fistula. It remained for sixteen days, and the animal was then allowed to live for two more weeks before serial sections of the bones were made. The specimen, prepared by Professor Nager in Zurich, Switzerland, showed that although the fistula was filled with fibrous tissue, there was no evidence of regeneration of bone. A portion of the bone on one side of the fistula stained somewhat differently from the rest; this may represent bone which was somehow changed by the radium.

From the clinical progress which has been so significant, I can now state that fistulization of the labyrinthine capsule is followed by enough improvement in hearing to justify its serious consideration as a therapeutic procedure in carefully selected cases. It is known that the operation under proper conditions can be performed without discouraging morbidity and with no mortality. But essential principles for success or failure and criteria for determining optimum cases now demand attention to various phases which, as yet, have been given scant notice. With this in mind I have postponed such operations and have considered and am doing further experimental work for more specific information.

14. Ménégaux, G., and Odiette, D.: Monograph, l'ostéosynthèse au point du vue biologique: Influence de la nature du métal (etude expérimentale), Paris. Masson & Cie, 1936.

I have had the privilege of assisting Professor Holmgren with his studies and have seen Dr. Lempert [15] operate. The approach to the external portion of the horizontal semicircular canal by each man's procedure is adequate. I can see no great advantage in one over the other. The actual method of making the fistula does differ. Professor Holmgren has recently used a scraping gouge, although much of his work has been done with an electric drill. Dr. Lempert uses a polishing

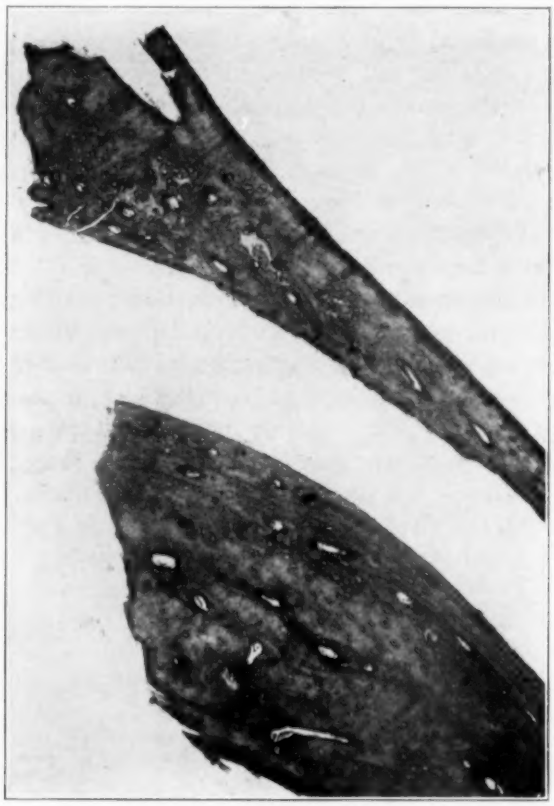

Fig. 1.—Fistula made with a sharp scraper.

burr driven with a dental engine. After the fistula is made there is a slight difference in the appearance of the bone around the fistula. After scraping, the bone is dull. After burring, it is shiny. The main question is, however: Has the bone been affected differently by the two methods? Has the actual mechanical process changed the bone? Should heat produced by the friction of the drill be considered? Does

15. Lempert, J.: Improvement of Hearing in Cases of Otosclerosis, Arch. Otolaryng. **28**:42 (July) 1938.

the drill injure bone cells which are not removed? Has the bone's power of regeneration been diminished? It is to some of these questions that I am now turning attention in the hope of finding answers by experimental means.

I have started a program of animal investigation, the first part of which I can now report.

My first experiment was designed to show any possible difference in the bone around the fistula immediately after the semicircular canal

Fig. 2.—Fistula made with a polishing burr.

was opened by the scraping and by the burring method. A freshly killed monkey was used, and fistulas in the superior semicircular canal were made. These bones were then prepared for microscopic study, and the following can be reported:

Figure 1 shows the fistula made with the scraper. The actual bone cut presents a sharp edge, blood vessels are severed and lacunas in the bone are open. Occasionally a spicule of bone is seen, but this is not a prominent feature. The gouge in some sections cuts the endosteum cleanly, and other sections show it be curled into the canal.

Figure 2 shows a fistula made with the polishing dental burr. Spicules of bone are prominent in these sections. There is uniformly a difference in the bone on the two sides of the fistula: One side always shows what appears to be more damage than is present on the opposite side. Blood vessels are opened as well as lacunas in the bone, the same as with the scraper. I can see no evidence that the bone is made denser by the use of the burr. Blood vessels are not filled with bone dust. Marginal lacunas are not morphologically different.

Fig. 3.—Another fistula made with a polishing burr.

Figure 3 shows another fistula made with the burr.

Study of these specimens shows some differences, the significance of which can be determined only when they are studied in relation to the response of living bone to the two types of trauma.

In the otic capsule the periosteal bone is the type which regenerates to close the fistula. This bone is easy to obtain for experimental work, and in the study described in the report which follows the cat's skull was used for observation of the vital response to defects in bone produced by various methods.

By the scraping technic first, defects were made, and the scalp was sutured together so that periosteum covered the defects. Fourteen days later the animal was killed and the defects prepared for microscopic study.

Figure 4 shows two defects. In each, fibrous tissue is forming and in the fibrous tissue new bone is present. Along the edge of the bone are many osteoblasts. The picture was about the same when the defect was made with two different types of sharp chisels, Holmgren's scraping gouge and a dental chisel. High power magnification of each defect shows the details of this response (fig. 5).

Fig. 4.—Scraped defects in a cat's skull.

Continuing with different tips on a dental drill, I made six defects on the same skull, three on each side of the midline. On the left side sharp instruments were used, a rotary saw for the first, a sharp burr for the second and a sharp drill for the third defect. In corresponding positions on the right side of the skull, a dull drill, a polishing stone and a polishing dental burr were used. The animal was allowed to live two weeks, and the bone was then prepared for microscopic examination.

Figure 6 shows under low power the defects made by the saw and a dull drill. A difference is easily noticed, and higher magnification revealed the essential contrasting elements. The defect cut with the sharp saw was partially filled with fibrous tissue, with many active osteoblasts producing new bone (fig. 7). The defect made with a dull

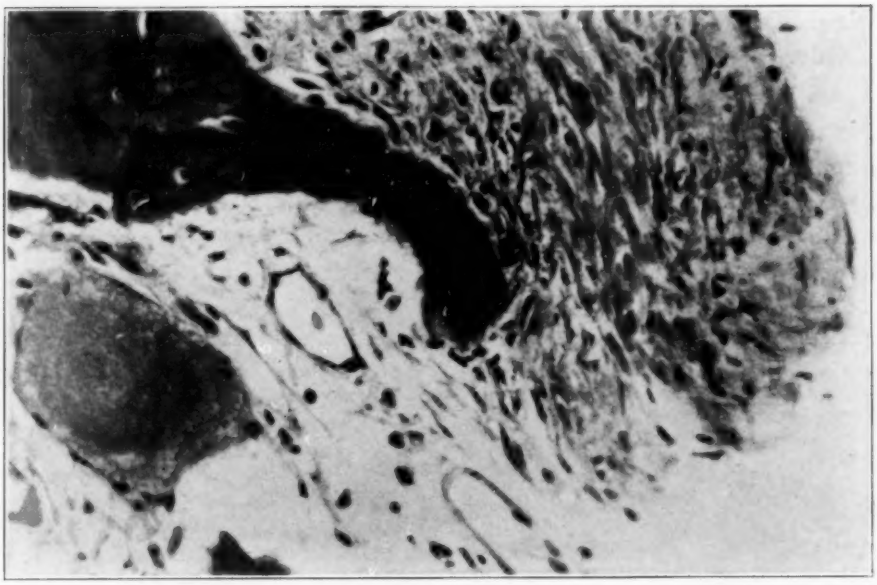

Fig. 5.—Scraped defect (high power magnification) after two weeks, showing regeneration of bone.

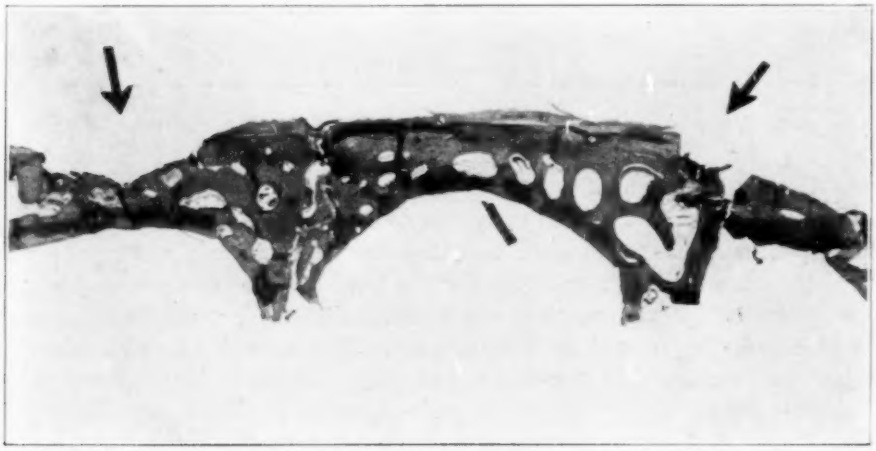

Fig. 6.—Defects made with a rotary saw (right) and a dull drill (left).

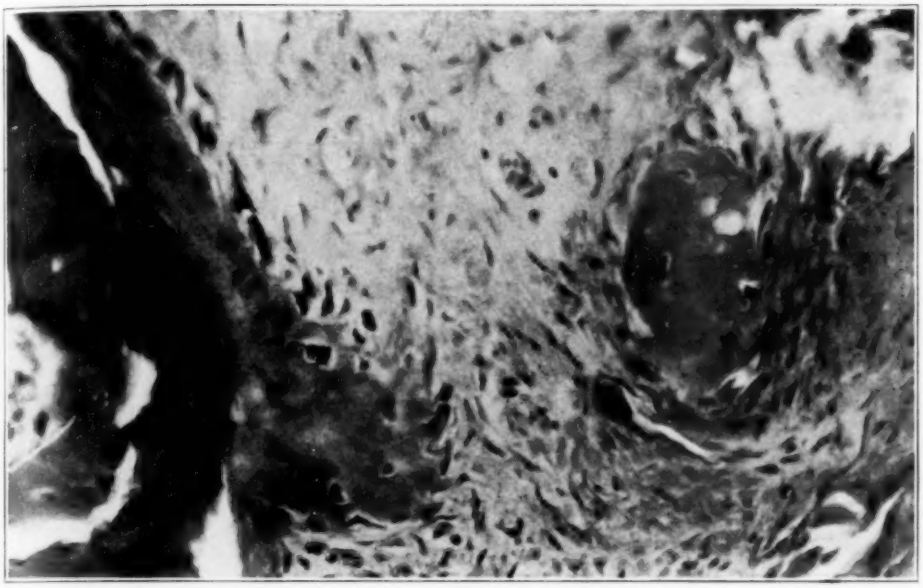

Fig. 7.—Defect made with a rotary saw, showing regeneration of bone (high power magnification from figure 6, right).

Fig. 8.—Defect made with a dull drill, showing no regeneration of bone (high power magnification from figure 6, left).

drill showed, however, almost no fibrous tissue, no new bone and almost no osteoblasts (fig. 8).

Sections of the defects made with a sharp cutting burr and the polishing stone showed the same variations.

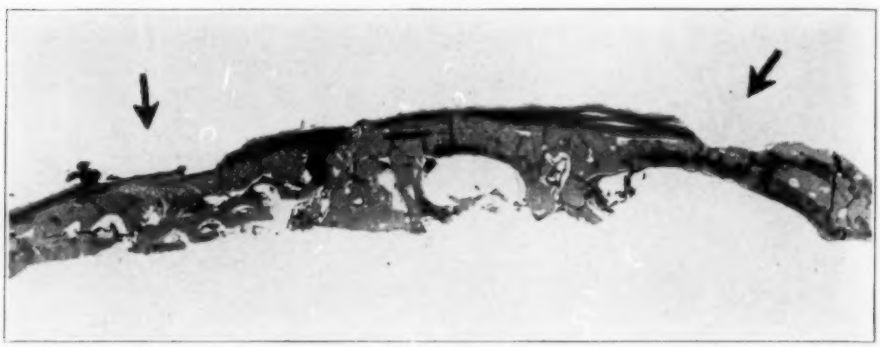

Fig. 9.—Defects made with a sharp drill (left) and a dental polishing burr (right).

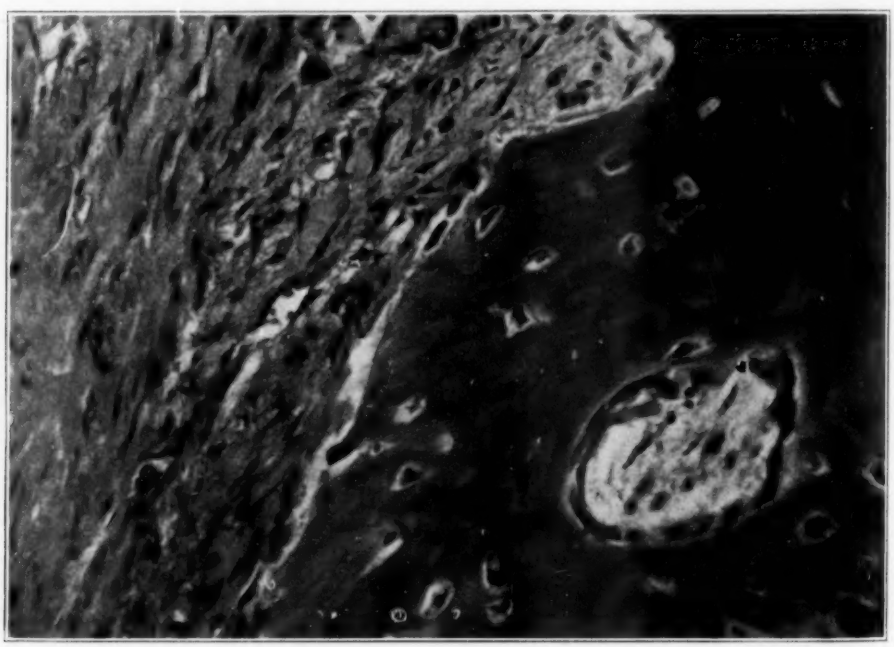

Fig. 10.—Defect made with a sharp drill, showing regeneration of bone (high power magnification from figure 9, left).

Sections of the defect made with a sharp drill and that made with the dental polishing burr again showed a difference. Figure 9 shows the defects made with these instruments. A high power magnification of

the same microscopic sections showed fibrous tissue, new bone and osteoblasts in the defect made with a sharp instrument (fig. 10), while in the defect made with the polishing burr no such response could be seen (fig. 11).

These observations were uniform throughout all the many serial sections through these defects. Each operative site was covered with the same type of tissue, which was periosteum. The differences were definite and are interpreted as being due to a different response on the part of the bone to the different methods of producing the defects.

Fig. 11.—Defect made with a dental polishing burr, showing no regeneration of bone (high power magnification from figure 9, right).

Since this report was submitted I have repeated the experiments in Philadelphia on the cat's skull, with similar results.

With this encouragement I am now planning to apply the method directly to labyrinthine bones.

SUMMARY

With the possible exception of the experiments with radium, reports of which will come from Holmgren, I can now say that experimental evidence with which I am familiar favors the opinion that the response of vital bone is similar when the defects are made in the same manner,

regardless of the type of tissue which has been placed over the defect. From experiments herewith reported, I noted that:

1. Morphologic variations exist in bone fistulas produced by different methods.

2. The response of vital periosteal bone differs significantly when defects are made with different instruments, although the defects are uniformly covered by the same type of tissue.

This evidence makes me believe that the essential point to be considered in maintaining labyrinthine fistulas is the management of the bone itself, with less regard to the nature of the tissue placed over the defects. The precise influences which are important in this variation I have not yet determined, but succeeding experiments will be designed to evaluate each element separately, in an attempt to determine just what must be the important consideration in the solution of this problem of bone biology.

OSTEOMA OF THE SINUSES, THE FRONTAL AND THE SPHENOID BONE

REPORT OF FIFTEEN CASES

JOHN H. CHILDREY, M.D.
SAN FRANCISCO

The literature on osteoma of the sinuses consists predominantly of reports of single cases or enumerations of cases reported previously, so that one might suppose the condition to be rare. Although the total number of cases reported up to 1935 was variously given as 145 [1] and 147 [2] and may not now exceed 200, since relatively few cases have been reported each year since then, it seems probable that this condition is far more common than is generally supposed and that many osteomas are not reported. The cases in the medical literature have been, as a rule, those in which the growth was extensive, with definite symptoms and with invasion of neighboring structures, in which diagnosis was not difficult and in which the need for treatment was urgent.

In support of the thesis that osteoma, although unusual, is not rare, 15 cases in which that diagnosis was made in the past eight years are reported briefly, with illustrations. These 15 cases were noted in a review of 3,510 roentgenograms of the sinuses, of which they comprise 0.43 per cent. Knapp [3] noted 8 cases in 56,000 records, or only 0.014 per cent of the total, indicating that in many the condition must not have been diagnosed. In the series of osteomas reported here roentgenograms were entirely responsible for the diagnosis of all except 2. Twelve were in the accessory sinuses and 3 were not.

Results of treatment have improved considerably, for in a series of earlier cases the operative mortality was as high as 45 per cent.[4] Surgical intervention has been recommended [5] as the proper treatment for all osteomas. When one considers that nearly all osteomas which were extensive or had serious complications have probably been recorded and

1. Carmody, T. E.: Osteoma of the Nasal Accessory Sinuses, Ann. Otol., Rhin. & Laryng. **44**:626-643 (Sept.) 1935.

2. Gatewood, W. L., and Settel, N.: Osteoma of the Frontal Sinus: Review of the Literature and Report of a Case Presenting Extended Invasion of the Orbit, Arch. Otolaryng. **22**:154-164 (Aug.) 1935.

3. Knapp, cited by Carmody.[1]

4. Tauber, cited by Gatewood and Settel.[2]

5. Wray, cited by Ball, J. M.: Modern Ophthalmology, ed. 5, Philadelphia, F. A. Davis Company, 1926, vol. 2, p. 1073.

that the number in seventy-five years is approximately 200 and also that many more osteomas may have existed with little or no discomfort to the patient, then one questions whether surgical intervention should be advised for all osteomas of the sinuses. Friedberg [6] in discussing osteoma of the mastoid called attention to the usual benign character of

Data on Fifteen Cases of Osteoma

Case No.	Sex	Age	Sinusitis	Other Disease	Nature, Origin and Situation of Osteoma
1	M	22	Polyp, each antrum	Temporary traumatic palsy of 7th nerve, strabismus, retrobulbar neuritis, undescended testicle	Large, right frontal sinus, limited by wall of sinus; unchanged 32 mo. later
2	M	57	None	Presbyopia, nerve deafness, incipient glaucoma	Small, dense, on interfrontal partition; unchanged 32 mo. later
3	F	38	None	Strabismus, carcinoma of larynx, hay fever	Small, in base of right frontal sinus, unchanged 9 mo. later
4	M	40	Pansinusitis	Compound myopic astigmatism	From inferior plate of right frontal sinus
5	M	?	Pansinusitis	Nasal polypi	Smooth, rounded, dense, 2 cm. in diameter, on floor of left frontal sinus
6	F	39	Purulent, both antrums		In left frontal sinus
7	M	58	Thick membrane, right antrum	Bilateral cataract, tabes dorsalis, retinal detachment, cerebral hemorrhage	Small, in right frontal sinus
8	M	27	Ethmoid sinuses and antrums	Traumatic strabismus, palsy of left 3d and 4th cranial nerve, deviated septum	Small, on floor of left frontal sinus
9	M	61	None	Gingivitis, retrobulbar neuritis, infected tonsils	Large, from floor and anterior wall of left antrum; possible osteochondroma
10	M	50	None	Infection of central nervous system with optic neuritis	Rounded, dense, from roof of right antrum
11	M	46	None	Presbyopia, blepharitis, infected tonsils, gingivitis	Small, in right posterior ethmoid sinus
12	F	45	None	Bilateral chronic suppurative otitis media	In midline of frontal bone
13	F	58	Purulent, ethmoid sinuses and antrums	Obesity, myocarditis	Large, involving both frontal sinuses
14	F	43	None	Paresis of 1st division of left 5th nerve and of left 4th nerve, fulness of left side of face, headaches for 5 yr., recent attacks of vertigo	Hyperostosis of left malar and temporal bones and of both wings of left sphenoid; unchanged 12 mo. later
15	M	66	None	Otitic paralysis of left facial nerve, dystrophy of left cornea, conduction deafness	Egg-sized, rounded, dense, on external surface of left frontal bone; present 45 yr.

the growth, which might often be disregarded. The same applies to many osteomas of the sinuses. Few patients will submit to surgical intervention because of the absence of symptoms with most osteomas and to the fear of disfiguring operations.

Osteoma of the frontal bone has been recognized for many years; it occurs not only in man but in animals, particularly in ruminants,

6. Friedberg, S. A.: Osteoma of the Mastoid Process, Arch. Otolaryng. **28:** 20-26 (July) 1938.

and may bear some relation to the horn-forming tendency.[2] It is more common in men than in women, as shown by the statistics for previous cases and for those reported here, in which 10 of the 15 patients were men. It is said [1] to be commoner in younger patients, but the average age of the patients reported here was 46.4. Only 2 patients were in the third decade, and in another (case 15) the osteoma had appeared at 21 years of age.

Osteoma may be found in many situations and under various conditions. It may occur on the mastoid process,[7] but it is rarer there than in the accessory sinuses of the nose. It is often difficult and not always important clinically to distinguish between a true bony tumor and a bony overgrowth resulting from inflammation, from disturbance in nutrition or from trauma, for histologically they are the same. Clinically also both are of bony hardness, fixed and not tender. In one, however, the bone is the essential element, and in the other it is a more or less accidental product. Only 1 of the 15 growths (case 14) was probably a hyperostosis; another (case 15) was the result of trauma but was probably a true osteoma. False bony tumors are exemplified in otolaryngologic practice by exostoses in the external auditory canal or on the hard palate and by ossified auricular and laryngeal cartilages, all fairly common. Spurious bony growths usually are of inflammatory origin and as a rule are derived from connective tissue. Fibroblasts acquire the function of osteoblasts because of proximity to bone, because of active productive inflammation with organization of dead tissue or because of a disturbance in the calcium metabolism.[8] Osteoma occurs in other tumors, such as fibroma and lipoma, as a result of ossification of connective tissue. It is seen in mixed tumors such as occur in the soft palate, and it develops in ossified cysts. Although infection has been shown to be present in a large percentage [9] of cases of osteoma, it is doubtful whether inflammation can be considered the principal cause, for according to Ewing [8] an inflammatory origin signifies a spurious neoplasm. If inflammation were the cause of so many of the osteomas in the sinuses one would conclude that many are not true osteomas, which seems doubtful. A history of infection of the accessory sinuses would be likely in a large percentage of any group of patients, for most people have colds and most colds are accompanied by sinal infection. In 7 (58.3 per cent) of the 12 cases of osteoma of the sinuses reported

7. Coates, G. M.: Osteoma Growing from the Mastoid Cortex, Arch. Otolaryng. **28**:27-28 (July) 1938. Friedberg.[6]

8. Ewing, J.: Osteoma, in Neoplastic Diseases, ed. 3, Philadelphia, W. B. Saunders Company, 1928, chap. 14, pp. 213-219.

9. Ersner, M. S., and Saltzman, M.: Osteoma of the Sinuses, Laryngoscope **48**:29-37 (Jan.) 1938. Gatewood and Settel.[2]

here sinusitis was demonstrated by roentgenograms. It is possible, of course, that more of the patients may previously have had sinusitis, which resolved. Only 1 patient (case 7) had syphilis. Interesting and probably irrelevant was the occurrence in cases 1 and 15 of palsy of the facial nerve. This followed an injury in the first case and otitis media in the second.

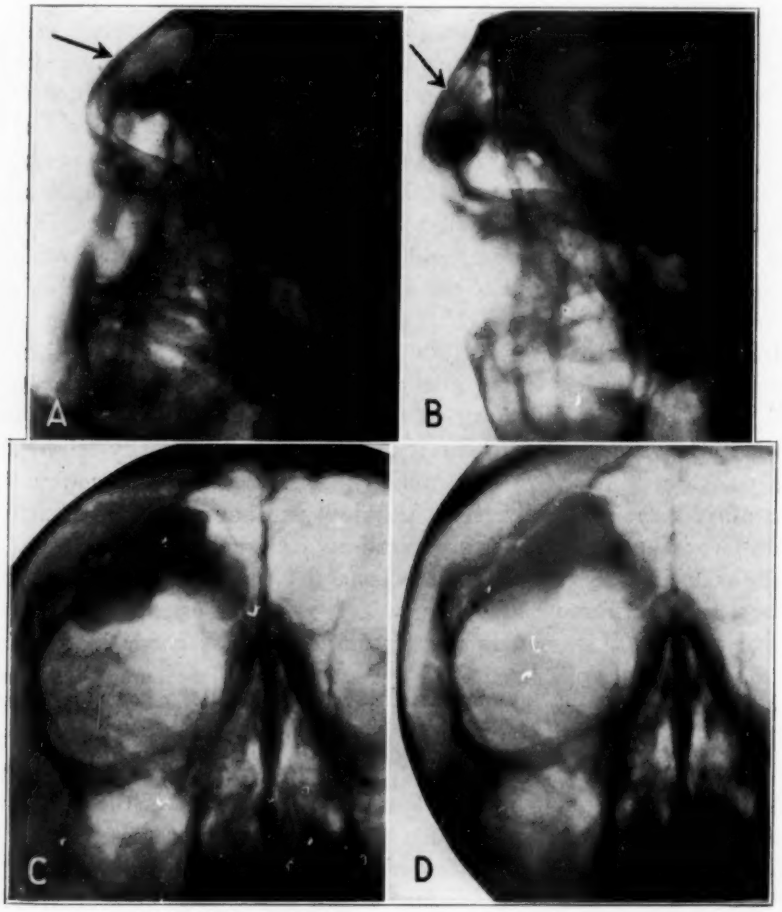

Fig. 1 (case 1).—*A* and *B*, wall of the sinus not affected; *A* and *C*, large osteoma of the frontal sinus. No change is seen in *B* and *D*, taken thirty-two months later.

A true osteoma is a circumscribed bony growth of spontaneous or traumatic noninflammatory origin. It is derived from cartilage and formed by the osteoblasts. The growth may be eburnated, spongy and cancellous or a combination of both types. Nearly all of the 15 osteomas reported were eburnated. Roentgenologically a single growth appeared to be both eburnated and cancellous and another to be an

osteochondroma. Fragments of cartilage connected with the ethmoid cells give rise to most of the osteomas of the frontal and maxillary sinuses.[8] The fact that such embryonic cartilaginous rests have not been demonstrated may be disregarded, for not many osteomas have been studied with this purpose in view.

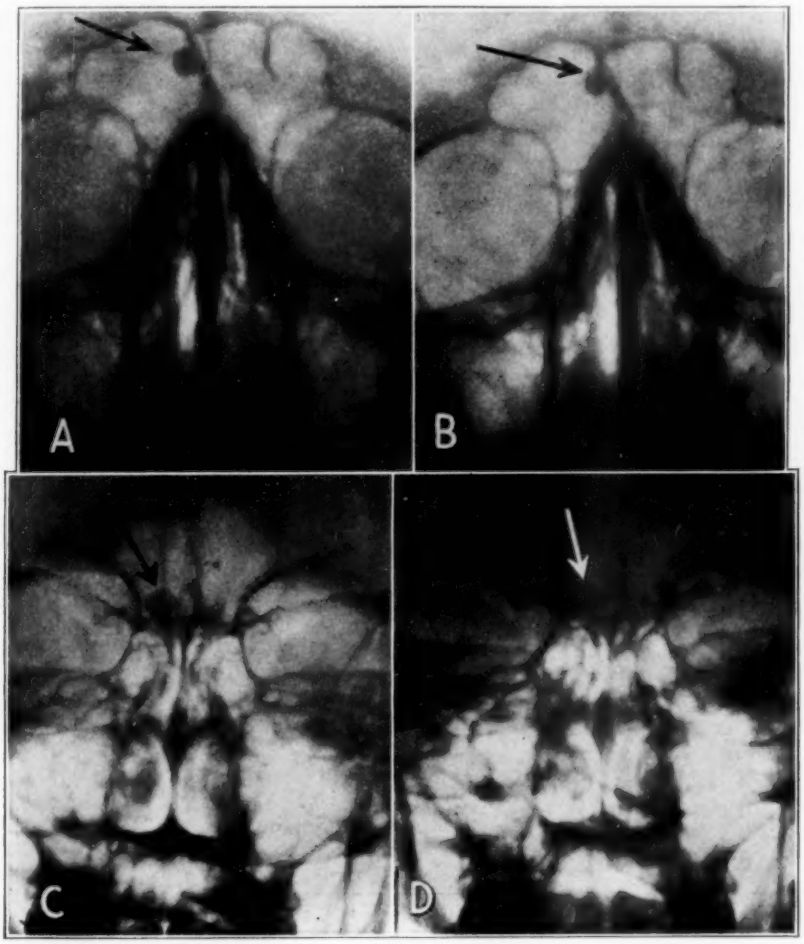

Fig. 2.—*A* and *B* (case 2), osteoma on the interfrontal partition. No change is seen in *B*, taken thirty-two months later. *C* and *D* (case 3), osteoma of frontal sinus. No change is seen in *D*, taken nine months later.

The site of attachment of osteoma of the sinuses varies considerably. In 12 of the 15 cases, the osteoma was in the sinus. In the other 3 it involved the frontal or the sphenoid bone without affecting the corresponding sinuses. Any of the sinuses may be the site of the growth,

but it occurs oftener in the frontal than in either the ethmoid or the maxillary. Nine (75 per cent) of the 12 sinal osteomas were in the frontal sinus. Most orbital osteomas rise in neighboring sinuses, particularly the frontal, or in the upper inner angle of the orbit, but they may occur in any of the orbital walls. Reports of involvement of more than one sinus by an osteoma are uncommon. In only 1 of the present cases, case 13, was more than one sinus affected. In this the osteoma

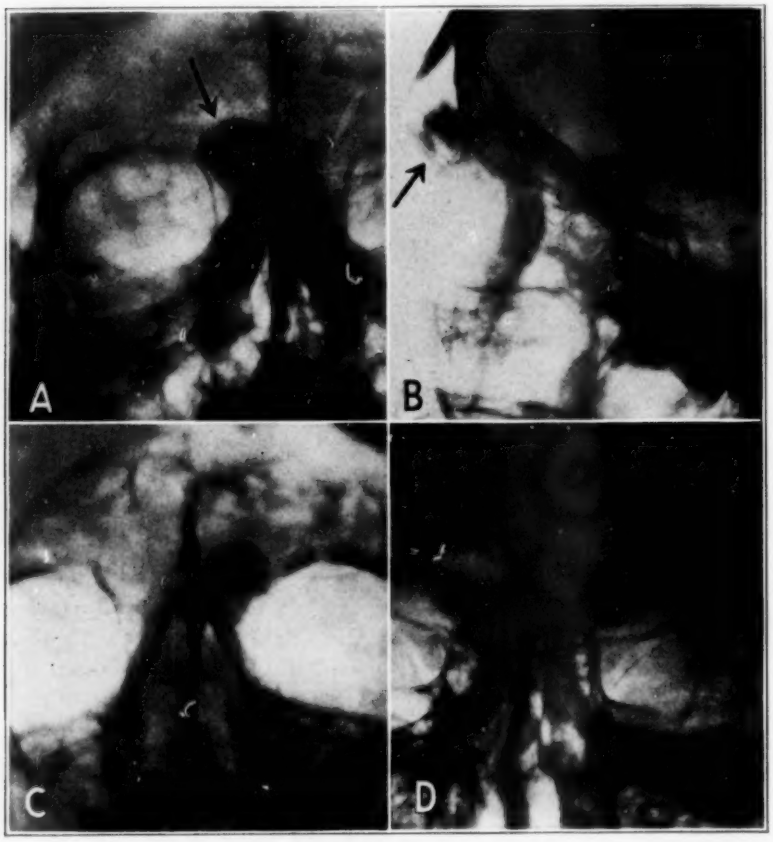

Fig. 3.—*A* and *B* (case 4), osteoma of the frontal sinus. *C* (case 5), marked grayness of all sinuses; osteoma in the left frontal sinus. *D* (case 8), osteoma of the frontal sinus.

filled both frontal sinuses. Cases have been recorded in which the growth was found loose in the nasal cavity or antrum or fell out of the orbit after destruction of the eye. It may penetrate the skull but seldom causes grave cerebral symptoms. These histologically benign lesions become dangerous only when they increase in size sufficiently to damage

neighboring structures by pressure, which is probably infrequently, for they grow slowly and usually grow to follow the outline of the wall of the sinus. In the first 3 cases and in case 14 roentgen examination of the osteoma after thirty-two, thirty-two, nine and twelve months, respectively, showed no change in its size. Patient 5 wrote sixteen months after examination that nasal polyps had been removed on two occasions but that nothing else had been done to the sinuses and the osteoma had caused no symptoms. In none of the cases did the osteoma penetrate the bone. The illustrations show the tendency of the growth to be

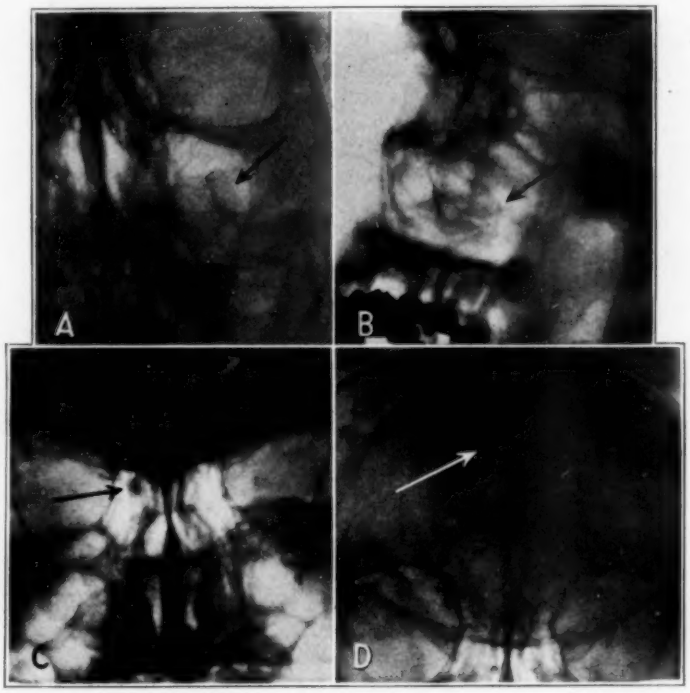

Fig. 4.—*A* and *B* (case 9), osteoma or osteochondroma of the maxillary antrum. *B* represents a lateral view. *C* (case 10), osteoma of the ethmoid. *D* (case 11), osteoma of the frontal bone, the sinus not being affected.

limited by the wall of the sinus. Symptoms are absent or slight, perhaps for years, and may never occur unless the tumor obstructs the aeration and drainage of a sinus, presses on nerves or invades other tissues. An acute cold may initiate the symptoms by the accompanying swelling of the mucosal lining of the sinus. The tumor may enlarge in any direction, and surrounding bone may be destroyed by pressure. Symptoms depend, then, on the direction of growth and the structures involved by it. An orbital osteoma may be diagnosed much earlier than one within the

sinus unless the latter is complicated by infection or disclosed by roentgenograms. One of the patients in the present series (case 14) had had symptoms of cerebral involvement for several years, which were mild, considering the extent of the growth; another (case 1) had frontal headaches which persisted two years and then subsided, and a third (case 4) had headaches which may have been from either the osteoma or a demonstrable concurrent attack of sinusitis. Only 1 patient (case

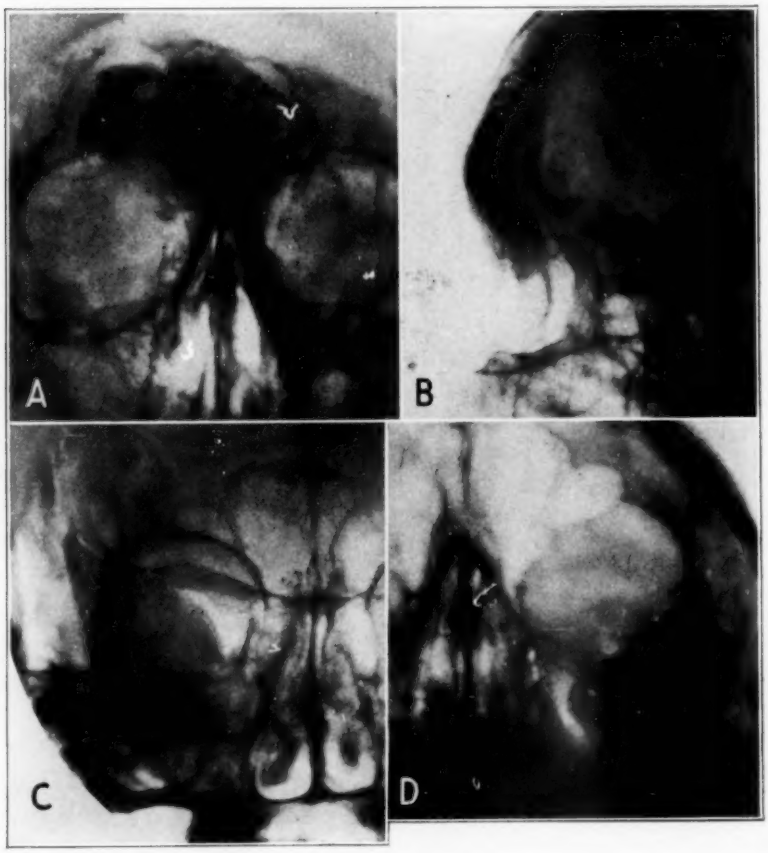

Fig. 5.—*A* and *B* (case 13), osteoma of both frontal sinuses. *B* represents a lateral view. *C* and *D* (case 14), osteoma or hyperostosis of the sphenoid wings and malar bone (two views).

15) knew of the osteoma, which had been first observed forty-five years before, or two years after an injury to the forehead.

Treatment of osteoma should be a surgical problem only when the tumor enlarges sufficiently to encroach on and endanger surrounding structures, when it extends intracranially or when it obstructs drainage

from a sinus. If the condition is complicated by symptoms of intracranial involvement or by infection, polyps or mucocele, the operative risk is greater. In such a case even a small osteoma should be removed. The statistics of Birch-Hirschfeld [10] showed that the mortality varies from 13 to 33 per cent for patients operated on, while the mortality for those not submitted to operation varies from 48 to 100 per cent, depending on the sinus affected. One must question his figures, however, because of the many unreported cases in which also no opera-

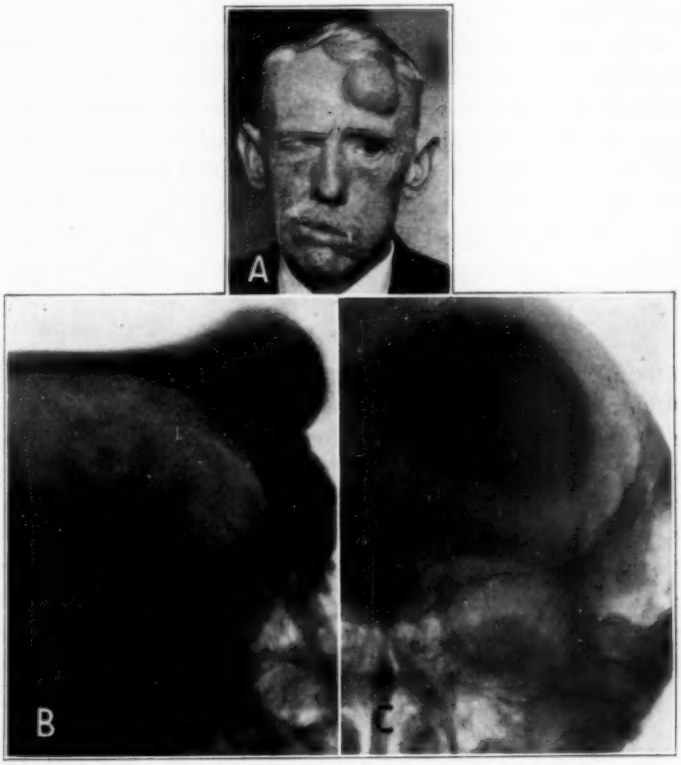

Fig. 6 (case 15).—Post-traumatic osteoma of the left side of the frontal bone, present forty-five years. The sinus is not involved.

tion was done. Until 1927 the approach to the osteoma was usually through the orbit, the sinus or the nose. Then Cushing [11] showed the necessity for an intracranial approach to some of the more extensive

10. Birch-Hirschfeld, cited by Ball, J. M.: Modern Ophthalmology, ed. 5, Philadelphia, F. A. Davis Company, 1926, vol. 2, p. 1073.

11. Cushing, H.: Experiences with Orbito-Ethmoidal Osteomata Having Intracranial Complications, with Report of Four Cases, Surg., Gynec. & Obst. **44:** 721-742 (June) 1927.

osteomas, an approach which Pilcher [12] also used. When removal of an osteoma becomes necessary, the most direct and the safest method must be used, and this may be determined by the size, situation and extent of the bony tumor. Although the transsinal approach may be preferable in most cases, the presence of much infection in a sinus may make it safer, in order to avoid an infected field, to remove the osteoma transcranially. These growths vary so much that they cannot be treated by any rule. The 1 patient in the present series (case 14) with intracranial symptoms could not be operated on because of the situation of the lesion. Roentgen rays were used with little or no effect. None of the other patients, of whom there were several, for whom surgical treatment was recommended was interested in having the osteoma removed. No treatment seemed indicated for the osteoma in case 15. Of 7 patients with various degrees of sinusitis, 2 (cases 1 and 7) received no treatment because of the mildness of the sinusitis; 2 (cases 8 and 13) were treated medically, patient 13 being a poor surgical risk; 2 (cases 5 and 6) refused to have sinal operations and 1 (case 7), operated on for maxillary sinusitis, was content not to have the osteoma disturbed.

SUMMARY

Osteoma, although unusual, was noted in 0.42 per cent of 3,510 roentgenograms of the nasal sinuses. The frontal sinus is most often affected by this slow-growing, histologically benign lesion, which seldom causes symptoms and does not often require surgical intervention. The average age of the patients was 46.4 years; men were affected more often than women. Various pathologic conditions were present in these patients, and sinusitis was diagnosed by roentgen examination in 58 per cent of those with osteoma of the sinuses. It seems questionable whether sinusitis often is the exciting factor in the formation of an osteoma; but when infection is present it increases the operative risk and may be an indication for surgical removal of the osteoma. When removal is indicated, none of the growth should be left, because of the probability of recurrence. Complete removal may, however, be impossible or, because of dangerous complications, undesirable. The decision whether to proceed transcranially or through the sinus rests with the operator and depends largely on the situation and extent of the osteoma. In 4 cases roentgenograms of the osteomas made after intervals of from nine to thirty-two months showed no change in them.

12. Pilcher, C.: Bony Intracranial Tumors, with Reports of Three Cases, South. M. J. **31**:613-619 (June) 1938.

MIXED TUMORS OF THE SALIVARY GLAND TYPE SEEN IN THE PHARYNX

C. CALVIN FOX, M.D.
PHILADELPHIA

Mixed tumors in or adjacent to the salivary glands come under the classification of teratomas. They contain tissue cells originating in the ectodermal and mesodermal embryonic layers.

There is a difference of opinion among pathologists as to the nature and origin of the tumors, but the most acceptable explanation is that they spring from cells that become isolated from normal groups of cells during the embryonic period and remain dormant in improper locations during the development of the body. For an undetermined reason, these cells become activated at some stage of life and undergo proliferation in their abnormal locations, where they are called tumors.

Fortunately, in mixed tumors the cells become isolated after they have reached an advanced embryonic stage of differentiation and resemble the adult tissues, whose capabilities are limited and strictly determined. Because they are cells of the adult type they are not considered malignant. Like most benign tumors they can be of any size and enlarge until they cause extraordinary and alarming mechanical disturbances.

There are a few vague references in the literature, by authors such as Neuhauser [1] and Pfannenstiel,[2] to mixed tumors that have become malignant and shown metastasis. MacCallum [3] expressed the opinion that if this doubtful condition occurs a few young or embryonic chorionic cells must be included in the rests. He stated the belief that this one type of cell in the tumor constitutes the malignant element and causes the metastases.

From the Department of Laryngology, Jefferson Medical College.

Read at a meeting of the Philadelphia Laryngological Society, Philadelphia, Jan. 3, 1939.

1. Neuhauser, H.: Ueber die Teratoiden Geschwülste des Eierstockes, Arch. f. Gynäk. **79**:696-719, 1906.

2. Pfannenstiel, J.: Die Erkrankungen des Eierstockes und des Nebeneierstockes, in Handbuch der Gynäkologie, edited by J. Veit, Wiesbaden, J. F. Bergmann, 1908, vol. 4, pp. 279-282.

3. MacCallum, W. G.: A Text-Book of Pathology, ed. 6, Philadelphia, W. B. Saunders Company, 1936.

The mixed tumors found in or attached to the salivary glands are truly tumors of these glands. The tumors herein reported were not actually in or connected with the glands. They were fully encapsulated and wholly apart from the salivary glands, apparently having developed from cells that were detached during the embryonic stage. The fact that they were in the immediate region of the glands and resembled their tumors microscopically entitles them to be diagnosed as tumors of the salivary gland type. Tumors of this type usually develop in early or middle life, and they occur in either sex. Their growth is slow in most instances, but there may be intervals of rapid growth or of complete quiescence. The tumors to be discussed occurred at the ages of 13 and 16, 1 in a girl and the other in a boy.

Mixed tumors of the salivary gland type present a varied and complex microscopic picture. According to Boyd,[4] there can be found in some part of the tumor, but seldom on one slide, masses of epithelial cells, often in glandular arrangement, mucoid connective tissue, cartilage and lymphoid tissue. The epithelium is from the ectoderm; the fibroblasts, lymphoid cells, cartilage and myxomatous elements are of mesodermal origin. Boyd offered the supposition that the cartilage sometimes present is not true cartilage but mucin secreted by the epithelial cells, which becomes a homogeneous myxomatous material that looks and stains like cartilage.

The attitude of the pathologist was well expressed by McFarland [5] in his classic report on "Three Hundred Mixed Tumors of the Salivary Glands," when he stated that it is difficult to arrive at a satisfactory conclusion with respect to mixed tumors. Their nature and origin are uncertain; their structure is various, and correlation between their structure and their clinical behavior gives contradictory results. He stated the belief that the microscope is not an aid to prognosis.

It is the purpose of this paper to discuss only mixed tumors of the type found adjacent to the salivary glands, in the pharynx. Since it was impossible to find a complete, connected compilation of information dealing with this type of tumor from its inception until it has been successfully eliminated from the body, it should be of interest herein to correlate this information on the basis of the observations and experiences gained in 2 specific cases of such a tumor.

The usual history is that the patient consults the physician because he has noticed such symptoms as a swelling just below the angle of the lower jaw or because of a feeling of fulness in the region of the tonsil.

4. Boyd, W.: A Text-Book of Pathology: An Introduction to Medicine, ed. 3, Philadelphia, Lea & Febiger, 1938.

5. McFarland, J.: Three Hundred Mixed Tumors of the Salivary Glands, of Which Sixty-Nine Recurred, Surg., Gynec. & Obst. **63**:457-469 (Oct.) 1936.

Ultimately, there is some inconvenience, but no distress, when swallowing. No history of injury was obtained in the cases observed. Because the discomfort is so slight, the patients usually do not consult the physician until some time after the onset of the swelling. McFarland [5] stated that in the average case the tumor requires ten years to reach the size of a walnut and twenty years to be as large as a lemon. Both tumors observed by me reached the size of a lemon when the patients were considerably younger than 20.

Inspection reveals, externally, a fulness or swelling of the neck below the lower jaw and the mastoid process, over the angle and adjacent surface of the mandible and over the parotid region anterior to the ear. The amount of swelling varies with the stage of growth of the tumor and gradually increases. There is no inflammation of the skin, and it is not adherent to the tumor.

Examination of the pharynx reveals a smooth medial bulging of the lateral pharyngeal wall. In the early stages one gets the impression that the tonsil has for some reason become enlarged. It has, as a matter of fact, been pushed medially into a more prominent position so that there is a tendency to regard it as the primary factor. In 1 case studied, the tonsils had been incompletely removed at this stage. As the tumor enlarges, the tonsil is crowded to the posteroinferior aspect of the growth at the base of the tongue and is almost completely obscured.

The soft palate is invaded and bulges downward and mediad in continuation with the prominence of the pharynx. Soon there is no line of distinction between the pharyngeal wall and the soft palate. The tumor pushes beyond the midline, carrying the somewhat edematous and enlarged uvula with it. The entire mass is smooth, glistening, rounded and covered by the indistinct and thinly stretched mucous membrane and pharyngeal muscles. There is no ulceration, inflammation or congestion of the vessels. The pharyngeal and nasopharyngeal orifices become so greatly diminished that it is hard to explain why there is so little embarrassment to swallowing and breathing.

Mirror examination of the nasopharynx shows little abnormality in the early stages. As the tumor enlarges, the lateral recess of the nasopharynx is rounded out in its inferolateral portion and the superior surface of the soft palate increases in convexity. In advanced stages it is difficult to make a mirror examination.

The nasopharyngoscope is satisfactory in observing the increasing medial bulge of the lateral wall of the nasopharynx and the upward prominence of the soft palate.

External palpation in well advanced stages shows the swollen tissues in the face and neck to be smooth, firm, brawny, nonsensitive and non-

fluctuating. The entire mass in the neck can be pushed mediad slightly. The skin is freely movable over the growth. The cervical glands are palpable, slightly enlarged and not tender and do not tend to suppurate. Interference with the lymphatic circulation is no doubt sufficient to cause some enlargement of these nodes.

Digital palpation within the pharynx shows that in the early stages the tonsillar tissue is prominent and seems to rest against a rather firm base but can be moved freely about, not being in itself a part of the firm tissue. As the tumor becomes large, the tonsil is pushed backward and downward, so that it is not easily palpated. The tumor is firm, almost smooth, with only indefinitely outlined nodular formation. There is no tenderness or fluctuation.

By placing a finger in the pharynx and the other hand on the neck, the tumor can be moved in small excursions from a medial to a lateral position and vice versa.

Without an anesthetic it is possible with the finger to follow the outline of the tumor upward into the soft palate, backward into the nasopharynx and downward behind the base of the tongue. This by no means reveals the true extent of the tumor. It is only when the tumor is dissected at operation that its surprising size and ramifications are appreciated.

The treatment of mixed tumors of the salivary gland type is surgical. The operation should be done whenever the growth has become large enough to be typical and positively diagnosed. Conservative treatment has been tried without avail. In 1 of the cases under discussion most of the possible measures were experimented with in an effort to avoid operation on the tumor before the patient came to the hospital with which I am associated.

It will be instructive to record the results of these treatments in order that time will not be lost in such useless efforts in other cases. No local application is of any value. Early removal of the tonsils does no harm, but it is of no help and creates unnecessary scar tissue and adhesions in the operative field. The tonsils can be removed at the time of the removal of the tumor.

Biopsy of tissue removed from the growth itself is unnecessary because the appearance of the tumor is so distinctive that it should be recognized. Removal of a specimen for biopsy destroys the integrity of the capsule and causes scar tissue to form between the capsule and surrounding structures. This makes the removal of the intact tumor impossible and increases the possibility that one will leave behind a piece of tumor tissue, which will surely grow again. This is in agreement with the statement of McFarland,[5] who pointed out that removal

of tissue for biopsy may do harm by breaking the capsule, thereby releasing tumor cells into the surrounding tissues and encouraging recurrences.

Removal of a cervical node for biopsy is contraindicated for much the same reasons. The nodes show no tumor cells, and the resultant scar tissue is so great that removal of the fully encapsulated tumor is impossible. In 1 case herein considered a lymph node was excised. The capsule and the scar from the incision in the neck were densely adherent, making removal of the tumor difficult and uncertain.

Radium therapy is of no value because the cells are not radium sensitive. McFarland [5] reported that irradiation is of no curative value but may temporarily shrink or stop the growth.

Rhoads and Mecray [6] stated that they see little use for irradiation and concluded that the treatment should be surgical removal. They use postoperative irradiation when the capsule is broken. The experiences of most operators indicate that it is of no value in preventing recurrences. It is of interest to note that McFarland [5] found incompletely removed tumors recurring after many years of inertia. Possibly, in some of the cases the tumors were completely removed, and the long delayed recurrence could be explained by the presence of additional embryonic rests that became activated later in life. The use of radium is contraindicated because of the tendency to destroy the surrounding vital structures in the neck and because it encourages fibrosis around the capsule.

Roentgen treatment has no effect on the tumors because they are, as stated before, not radiosensitive. It is contraindicated because it causes adhesions about the capsule, passes through important tissues in the neck and increases dryness in the pharynx before and after operation. In 1 case observed a series of roentgen treatments was administered without benefit and with the disadvantages stated.

Complete surgical removal of the tumor can, and should, be accomplished through an intrapharyngeal incision. This procedure leaves no more distortion than many tonsillectomies and no alteration of function of the pharynx. It avoids a large incision in the skin and the danger entailed by working through the important structures of the neck. The operative field can be made free from annoying bleeding during operation and the danger of postoperative hemorrhage eliminated by ligation of the external carotid artery.

The procedure of operation requires that the skin of the neck be prepared before and after the patient reaches the operating room. The nose and throat should be as free from active infection as possible.

---

6. Rhoads, J. E., and Mecray, P. M., Jr.: Recurrence in Mixed Tumors of the Soft Palate, Am. J. M. Sc. **193**:389-393 (March) 1937.

Avertin with amylene hydrate, supplemented by ether administered intratracheally, has proved a satisfactory anesthetic in these cases, but ether given intratracheally can be used as the only anesthetic.

In the cases under discussion the combined method was used. Avertin with amylene hydrate, 90 mg. per kilogram of body weight, was given twenty to thirty minutes before the operation. Morphine and atropine can also be given hypodermically at this time. Just prior to operation, a Flagg intratracheal tube is inserted, around which moist gauze is packed firmly into the lower part of the pharynx. In my cases it was necessary to give small amounts of supplemental ether through the tube to get complete relaxation of the pharyngeal muscles. Suction is used during the operation to keep the pharynx free from venous blood and fragments of tissue.

The external carotid artery is ligated in the usual manner between its lingual and superior thyroid branches.

In the pharynx, an incision is made at the anteromedial edge of the indistinct anterior pillar of the tonsil, extending from the soft palate above to the base of the tongue or the lower border of the tumor below. Another incision follows as closely as possible the line of the posterior pillar of the tonsil and joins the anterior incision superiorly; thus an inverted U-shaped incision is made along the anterior, the superior and the posterior surface of the tumor. Because the tissues are tensely stretched, it is not easy to identify the edge of the muscles of the tonsillar pillars, but it is always possible to select mucous membrane in which to make the incision. Care should be exercised to avoid incising the capsule of the tumor.

Dissection of the soft pharyngeal tissues from the capsule is started with a blunt tonsil dissector. As soon as the wound is large enough, the removal of the mass is more easily and safely carried to completion by finger dissection.

In each operation the dissection followed distinct lines of cleavage. The tumors occupied a space medial to the investing layer of the cervical fascia, anterior to the prevertebral and posterior to the pretracheal fascia. It was surprising to find that the dissection extended superiorly along the transverse processes of the cervical vertebrae to the occipital bone. It was possible to palpate the edge of the foramen magnum during this stage of the operation.

The most difficult points to reach are beneath the mandible and high along the cervical vertebrae against the occipital bone. These places are more accessible if the tumor is first freed at all other points. When the capsule is completely free, the mass can be delivered intact through the incision into the pharynx.

If the capsule is torn the tumor tissue must be completely removed in fragments. It can be distinguished from the surrounding tissue because of its greater density and firmness.

After removal of the tumor, the tonsil can be seen and easily removed.

The wound is loosely packed with iodoform gauze, and one or two sutures are used, merely to prevent the packing from slipping down into the larynx. The intratracheal tube and its surrounding packing are removed.

The tumor when delivered intact is covered by a well defined glistening white capsule carrying on its surface a number of fairly large blood vessels. The surface is somewhat irregular because of large but not prominent nodules. In a few areas there are lacunas that contain a clear fluid, possibly lymph. When the capsule is ruptured the pieces of tumor are pale yellow and have a granular appearance.

The tissue should be sent to the pathologist for final identification.

The postoperative regimen is as follows: A liquid diet is given for forty-eight hours and soft food on the third day. The packing is removed on the third or fourth day. A warm saline mouth and throat wash is used after meals. Sedatives are given when needed, but there is little pain after the first twenty-four hours. The temperature is elevated on the day after operation to perhaps 101 F. but gradually reaches normal in from three to five days. The local reaction in the pharynx is slight, and healing is rapid. The cutaneous sutures are removed on the fifth or sixth day, and the patient is allowed to be out of bed. No postoperative roentgen or radium treatment is given.

Inspection of the patient should be made at intervals for a period of years, but if the tumor is completely removed there will be no recurrence.

REPORT OF CASES

CASE 1.—R. R., a white girl aged 13, was referred to the otolaryngologic clinic on Aug. 24, 1937. Her chief complaint was a swelling under the left side of the lower jaw, first noticed six months earlier, in January.

History.—The family history was noncontributory. The patient had had the usual diseases of childhood, and tonsillectomy had been done in August 1935. The patient noticed a swelling under the left side of the mandible in January 1937, without tenderness, pain, bleeding or discomfort in swallowing. She consulted a physician in another city and was given a series of roentgen treatments from May until a week before she came to the otolaryngologic clinic, a period of between three and four months. The swelling continued to increase. The patient came to the otolaryngologic clinic and was referred to the tumor clinic, where a piece of tissue for biopsy was removed from below the angle of the jaw. Study showed the growth to be a mixed tumor. The patient was admitted to the hospital on September 24.

Examination.—On her admission to the hospital no abnormality was observed except for the tumor in the neck and pharynx. The larynx could not be visualized, because of the pharyngeal mass.

A bulging, globular mass involved the left tonsillar region and lateral pharyngeal wall. It extended upward into the soft palate as far forward as the hard palate; downward to a point slightly below the lower pole of the tonsil; medially to the midline of the pharynx, displacing the uvula to the right side; anteriorly to the last molar tooth, and posteriorly to the posterior pharyngeal wall.

The mass was rounded, firm, smooth and covered by mucous membrane, without tenderness, bleeding or ulceration. There was no pulsation. Externally a mass appeared beneath the angle of the left side of the mandible and the adjacent part of the neck. This mass was firm, smooth and not inflamed or tender. The lymph nodes were not involved. When the tumor was first observed, the skin was freely movable. After removal of tissue for biopsy the skin was adherent to the mass.

Roentgen studies showed the sinuses, cervical vertebrae, trachea, heart and lungs normal.

The complete blood count was normal and the Wassermann reaction of the blood negative.

Operation.—Operation was performed in conjunction with Dr. Louis H. Clerf. Avertin with amylene hydrate, 90 mg. per kilogram of body weight, supplemented by ether given intratracheally through a Flagg tube, was administered. The pharynx around the tube was firmly packed with moist gauze.

The external carotid artery was ligated between the lingual and the superior thyroid branch.

An incision was made at the medial edge of the anterior faucial pillar, from the base of the tongue to the soft palate and then downward along the posterior pillar of the tonsil. The tumor was freed by blunt dissection, but the capsule was adherent laterally to the scar in the skin of the neck which had resulted from the removal of tissue for biopsy, and it had to be ruptured. The growth was then removed in pieces. The dissection extended behind the tip of the mastoid to the occipital bone along the cervical vertebrae. Downward it extended below the level of the jaw; laterally, to the ramus of the mandible; posteriorly, to the posterior pharyngeal wall, and anteriorly, to the last molar tooth.

There was little bleeding. The wound was packed with iodoform gauze, and two sutures inserted to retain the packing. The Flagg tube and its packing were removed.

The tumor tissue was sent to the pathologist for study. Microscopic examination showed a mixed tumor of the salivary gland type (fig. 1).

Postoperative Course.—Progress was uneventful. Soft food was given on the third day and was easily swallowed. The sutures and packing were removed on the fifth day. There was a slight reaction in the wound for a few days, such as is seen after tonsillectomy. The temperature arose to 101 F. on the day after operation and gradually returned to normal on the fifth day. The patient was discharged from the hospital on the tenth day in good condition.

She has been followed for over a year, and there has been no recurrence.

CASE 2.—B. K., a white youth aged 16, was referred to the otolaryngologic clinic on April 12, 1938. His chief complaint was swelling in the left side of the pharynx.

History.—The patient's father had diabetes. The patient had had the usual diseases of childhood. Tonsillectomy had been performed in March 1938. At

a routine Citizen's Military Training Camp examination in February, three months before he came to the clinic, a swelling of the left side of the soft palate and pharyngeal wall was discovered. There was no pain, tenderness or discomfort when swallowing. There was no alteration in the voice. The patient noticed a gradual increase in the size of the growth during the three month period before coming to the hospital. A tonsillectomy was done in another city in March, and on two or three occasions incisions were made into the swelling in a vain attempt

Fig. 1 (case 1).—Section from a mixed tumor of the salivary gland type found in the pharynx, showing a large amount of myxomatous tissue, a few islands of glandular epithelium surrounded by fibroblasts and marked vascularization.

to find fluid. No roentgen treatment was given. No biopsy was done before or after he came to the clinic.

Examination.—His physical condition was essentially normal except for the mass in the pharynx and neck. There was no cough, dyspnea or cyanosis.

There was a smooth, rounded mass in the left side of the pharynx, involving the tonsillar area. It extended upward into the soft palate as far forward as the hard palate; downward to the base of the tongue at the level of the epiglottis;

medially to beyond the midline, displacing the slightly swollen and edematous uvula far to the right side; anteriorly to the last upper molar tooth, and posteriorly to the posterior pharyngeal wall. Thus, the oropharynx was almost two thirds closed by the mass. The growth was rounded, firm and covered by mucous membrane and pharyngeal muscle that was tightly and thinly stretched. There was no inflammation, tenderness, bleeding, ulceration or pulsation. With the nasopharyngoscope, the soft palate could be seen bulging upward, and the lateral wall of the nasopharynx, bulging mediad. Examination of the larynx could not be made because of the tumor (fig. 2).

Externally there was a mass extending from beneath the ramus of the lower jaw downward in the neck for about 1½ inch (3.8 cm.) and backward to the tip of the mastoid. There was a rather firm thickening of the side of the face anterior to the ear above the ramus of the mandible.

Fig. 2 (case 2).—Mixed tumor of the salivary gland type in the lateral pharyngeal wall and soft palate. The tonsil is below and behind the growth; the uvula is edematous and pushed to the right side. The oropharyngeal space is greatly reduced.

There was some stiffness of the jaws, so that the mouth could not be fully opened. By placing a finger in the pharynx and a hand on the neck, the tumor could be moved slightly, with the tissues of the neck, from a medial to a lateral position and vice versa.

The mass was firm and smooth, and the skin was freely movable over it. The cervical glands were slightly enlarged and firm below the angle of the jaw.

Roentgen examination showed a sharply defined tumor arising from the posterior wall of the hypopharynx. Its lower margin was just above the tip of the epiglottis. Its upper limits were obscured by the posterior vertical rami of

the mandible. There were swelling and haziness in the region of the larynx and hypopharynx.

The complete blood count was normal. The urine was normal. The Wassermann reaction of the blood was negative.

Operation.—Operation was performed on July 15, 1938, with the patient under anesthesia, induced by avertin with amylene hydrate 90 mg. per kilogram of body weight, supplemented by ether given intratracheally through a Flagg tube. The pharynx around the tube was firmly packed with moist gauze.

The external carotid artery was ligated in the usual manner between the lingual and the superior thyroid branch.

An incision was made through the mucous membrane at the medial edge of the anterior tonsillar pillar, from the base of the tongue upward to the soft palate and then backward and downward along the posterior pillar. Dissection was started with a blunt dissector, but as soon as possible the finger was inserted to complete it. The growth was removed intact within its capsule and easily delivered into the mouth. The dissection extended upward to the occipital bone,

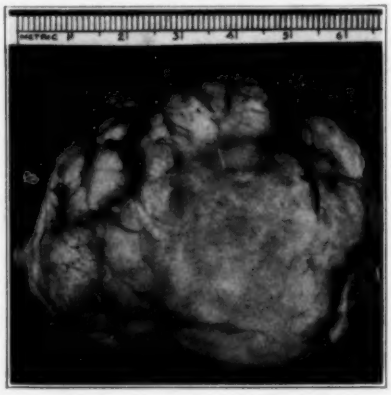

Fig. 3 (case 2).—The tumor shown in figure 2, after its removal from the pharynx. The capsule is intact. The surface is somewhat nodular. A few of the numerous blood vessels can be seen.

behind the tip of the mastoid, along the transverse processes of the cervical vertebrae to the foramen magnum; downward, to the base of the tongue at the level of the epiglottis; mediad, to beyond the midline of the soft palate; laterally, to the medial surface of the mandible and into the neck immediately below; anteriorly, to the last upper molar tooth, and posteriorly, to the posterior pharyngeal wall.

Bleeding was slight. The wound was loosely packed with iodoform gauze and one suture inserted at the lower margin of the wound to retain the packing. The Flagg tube and the packing surrounding it were removed.

The tumor was smooth, firm and slightly nodular. It was completely encapsulated. The capsule contained numerous fair-sized blood vessels. Just beneath the capsule were a few lacunar spaces containing a small amount of clear fluid.

The tumor was sent to the pathologist, who found it to measure 7.5 by 5.5 by 3.5 cm. and to weigh 65 Gm. (fig. 3). Microscopic examination showed a mixed tumor of the salivary gland type (fig. 4).

Postoperative Course.—Progress was uneventful. Liquids were given for forty-eight hours, and on the third day soft foods were easily swallowed. There was surprisingly little pain or swelling. The temperature rose to 101 F. on the day after operation but gradually returned to normal on the third day, when the packing was removed. There was less reaction in the wound than is seen with many tonsillectomies. The patient was out of bed in a chair on the fifth day and discharged from the hospital in good condition eight days after operation.

Fig. 4 (case 2).—Section from the mixed tumor of the salivary gland type seen in figure 3, showing a large amount of fibroblasts and glandular epithelium, with much less myxomatous tissue and vascularization than is seen in figure 1.

Normal function of the pharyngeal tissues has completely returned, and the tumor has not recurred after more than six months.

CONCLUSIONS

Mixed tumors of the salivary gland type occur entirely separated from the glands, are benign and can occur at any age in the neck and pharynx.

They probably originate from embryonic cells that become separated from the body of the gland. They contain tissues derived from both the ectoderm and the mesoderm. The microscopic structure is varied and complex.

They develop gradually in the tonsillar and the palatine area until they occupy a large portion of the pharyngeal space.

They are firm, slightly nodular and completely encapsulated, do not break down and cause little local reaction or discomfort.

Their appearance and behavior are so distinctive that they can readily be diagnosed. Biopsy is unnecessary and contraindicated because taking the specimen complicates removal of the tumor.

Local applications and roentgen or radium irradiations are of no value in treating these tumors.

Surgical removal through an intrapharyngeal incision is the most satisfactory way to eliminate the tumor.

Care should be taken to preserve the continuity of the capsule. If it is ruptured, a piece of tumor tissue may remain and grow again.

There is little postoperative reaction; recovery is rapid, and function is soon restored.

There will be no recurrence if all the tumor tissue is removed.

1806 Spruce Street.

OTOLARYNGOLOGIC INSTRUMENTS

JOSEPH C. BECK, M.D.
CHICAGO

Several of the instruments to be described have been used by me for a long time, but I have never presented them for publication. While none of them are of any unusual scientific value, they have proved themselves practical to me.

TASTE AND SMELL TESTER

A device for testing the senses of taste and smell of a patient can be constructed at home. It utilizes ten essential substances that are used in everyday life by the usual patient. It consists of a wooden box 12.5 cm. long, 6.5 cm. wide and 5.5 cm. high (fig. 1). Ten holes are bored into it, and in each hole is placed a small glass vial; each vial is labeled and contains an essential solution. The fluids used are as follows: for testing the taste, (1) sugar solution, (2) oil of sweet orange, (3) salt solution, (4) solution of pepper and (5) vinegar; for testing the sense of smell, (1) perfume, (2) essence of onion, (3) spirit of camphor, (4) purified petroleum benzine and (5) ammonia water. Each vial is fitted with a glass stopper having a glass applicator attached to it, which facilitates placing the solution either on the tongue or under the nose of the patient.

COTTON RESPIROMETER

A forceps is supplied with a locking device that keeps its curved end closed. A small fluff of cotton or a narrow strip of gauze is placed in the forceps as shown in figure 2, and the end of the forceps is placed against the columella of the nose. When the patient inspires, the cotton is displaced upward; when the patient breathes out through the nose, the cotton is forced downward. With this simple test one can determine which side of the nose, if either, is wholly or partially blocked even before examining the nose to see what causes the obstruction.

EAR MASKER AND BLINDER

An instrument made on the principle of a telephone operator's headband slides easily on and off the head and can be adjusted readily to

Read at the Forty-Third Annual Convention of the American Academy of Ophthalmology and Otolaryngology, Washington, D. C., Oct. 13, 1938, and at a meeting of the Chicago Laryngological and Otological Society, Chicago, Dec. 5, 1938.

fit any head size by means of a screw on top of the band (fig. 3). To one side of the head band is attached a thin metal disk, 8.5 by 7 cm., which fits snugly over the pinna. The disk is roughened on the outside

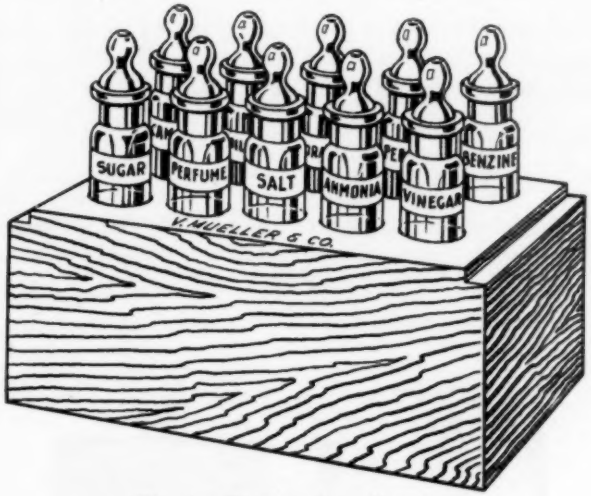

Fig. 1.—Taste and smell tester.

Fig. 2.—Cotton respirometer.

(shown by cross hatching in the illustration) so that the patient or an assistant can scratch it lightly with the finger tips, thus making a sound which masks the ear on that side. To the other end of the head band

is attached a square piece of semi-sound-proof material, 6½ by 10 inches (16.5 by 25.4 cm.), having an oval slit in the center to accommodate the pinna. It extends in front of the eye, serving as a blinder so that the patient cannot see to read the examiner's lips. This instrument is more effective in masking than simple plugging of the canal with the finger or buzzing of the audiometer receiver, and it also can obviate the use of an assistant to rub the pinna as is customary.

COIN TESTER

A round or square disk of hard wood is fitted with a handle at the bottom and a guard around the circumference (fig. 4). Coins of various denominations are flicked into this bowl, or device, as shown in the accompanying diagram. The coins are a silver dollar, a half-dollar, a quarter, a dime, a nickel and a penny. The sound of the coins is familiar

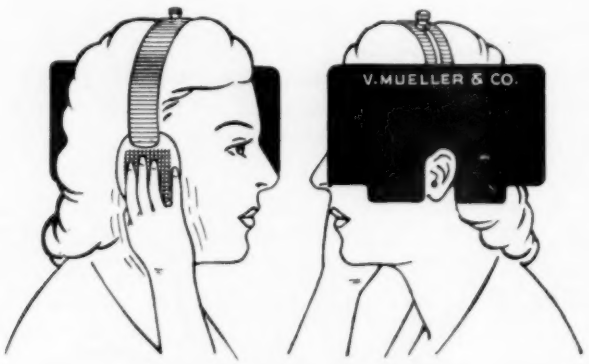

Fig. 3.—Ear masker and blinder.

to any patient, and the identification of the coin by the sound while the patient's eyes are closed is a good rough test of the patient's hearing and also gives one some index of the patient's interpretation of the direction of the sound.

JOE BECK'S OTOLARYNGOLOGIC WALKING CANE

In the head of a cane (fig. 5) is a small reflecting mirror which opens by means of a hinge. Inside the cane is a tube 12 inches (30 cm.) long, containing a combination instrument consisting of a nasal speculum, tongue depressor, laryngeal mirror and aural speculum (fig. 6). The tubular part can be detached. There is a small light operated by two dry cell batteries, not unlike the vest pocket light of most physicians. For many who use a walking cane, this type of cane proves useful in emergencies when one does not have one's instrument case.

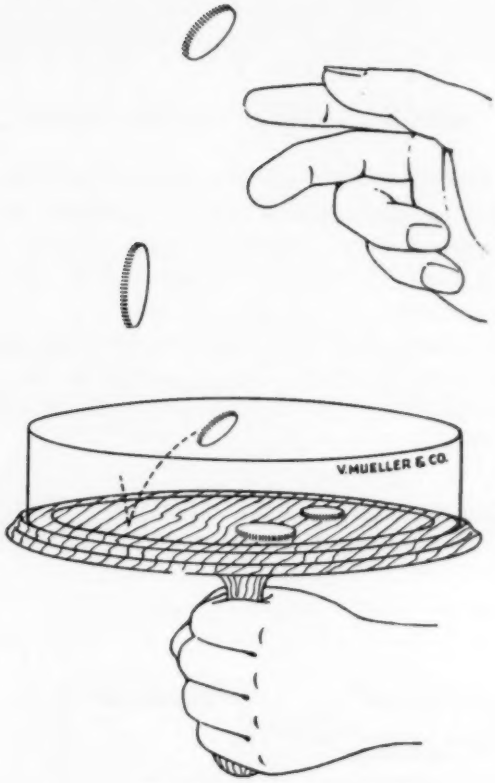

Fig. 4.—Coin tester.

Fig. 5.—Joe Beck's otolaryngologic walking cane.

TEMPORAL BONE CORER AND EXTRACTOR

Because many people object to complete autopsies about the head, I have adopted instruments with which the temporal bone can be removed post mortem by means of a simple incision over the mastoid. Thus the head of the corpse is not distorted in any way.

The temporal bone corer [1] is a large trephine operated with a hand brace. In the center of the trephine is a small bit also attached to the brace. This bit extends ½ inch (1.27 cm.) from the trephine which it

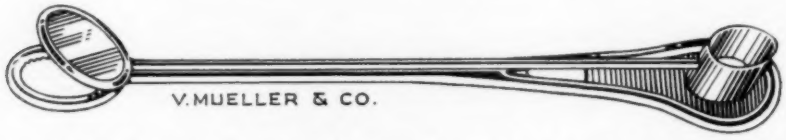

Fig. 6.—Nasal speculum, tongue depressor, laryngeal mirror and aural speculum.

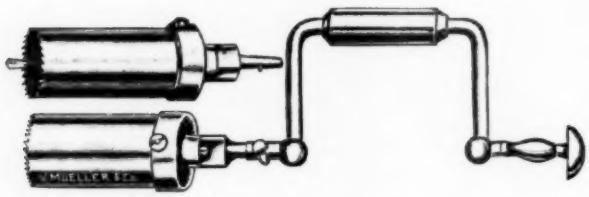

Fig. 7.—Dr. Lowell Dunn's core drill for cutting temporal bones.

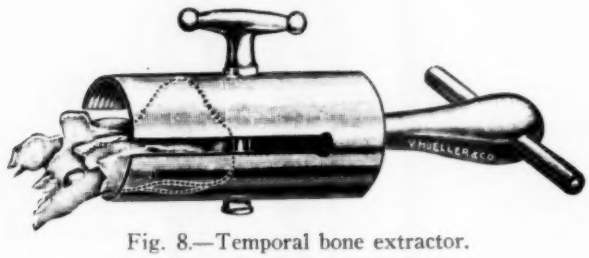

Fig. 8.—Temporal bone extractor.

guides. It is removed by turning a hand screw on the side of the trephine, as shown in the illustration (fig. 7). The trephine is made in two sizes, one for adults and one for children. The adults' size is 3¾ inches (9.5 cm.) long and 2 inches (5 cm.) in diameter. The children's size is 3¾ inches (9.5 cm.) long and 1⅝ inches (4.13 cm.) in diameter.

The temporal bone extractor (fig. 8) is a bivalve cylinder 2 inches (5 cm.) in diameter and 4 inches (10 cm.) long, having four short

1. The temporal bone corer was first described by Dr. F. Lowell Dunn and was called "the core drill." Dunn used the instrument by boring down from the floor of the skull after the calvarium and brain were removed. I have modified it and added the extractor.

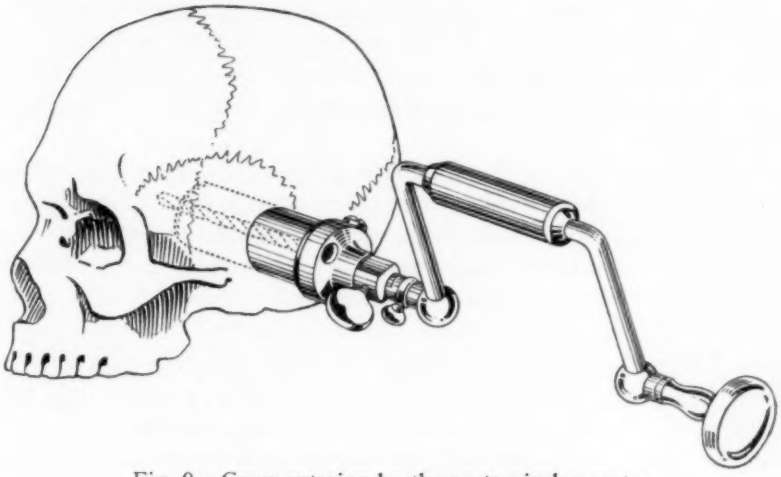

Fig. 9.—Corer entering by the postauricular route.

Fig. 10.—Corer in place in the mouth.

sharp teeth inside and a hand screw on the side, which when turned causes the two blades of the instrument to approximate each other, thus holding the temporal bone tight between them. By several lateral movements of the extractor the temporal bone is removed, with some soft tissue attached.

The corer is used in the following manner: After a postauricular incision—and at times another, horizontal, one, to get greater exposure over the mastoid—is made, the periosteum overlying the bone is incised and retracted. The bit is placed about 4 mm. inferior and posterior to the external auditory meatus. The direction is forward, upward and inward. After several turns with the brace the bit is removed, and the trephine is replaced and set in motion in the direction named. The auricle is pulled well forward, and the instrument severs the cartilaginous from the bony canal (fig. 9). After the trephine has traversed its entire length it is removed; the extractor is placed in position as stated, and the temporal bone is extracted.

The instrument can be used intraorally also, in order to extract the sphenoid and the tip of the petrous pyramid. The technic is as follows: The lower jaw is subluxated so that the condyloid processes of the mandible are brought forward. In this way the mouth is opened as wide as possible. A side mouth gag is used to keep the jaws open. The bit is placed in the mouth so that the end points outward and upward in the direction of the tip of the petrous (fig. 10). The corer will take in the sphenoid bone and the tip of the pyramid. Contained in the specimen removed are also the posterior clinoid process and a portion of the hard palate. This technic is more difficult than that of the postauricular route but is mentioned here for the sake of completeness. I have employed it only once. The small corer is the one that should be used when the intraoral route is chosen. The extractor for this procedure has blades that are 6 inches (15.2 cm.) long, but the diameter is the same.

After the specimens are removed by the postauricular or the pharyngeal route the defects are filled in the usual manner. In case the mastoid route is used the overlying skin is sutured or clipped. The corer may be used after embalming, and pathologists tell me that subsequent histologic work is not interfered with. The specimen of the temporal bone removed in this way contains all the anatomic structures that are necessary for study.

185 North Wabash Avenue.

Case Reports

PONTILE ABSCESS

JOSEPH B. GAIDA, M.D., ST. CLOUD, MINN.

Previously only 11 cases of pontile abscess have been reported in the literature. Gowers,[1] in his "Manual of Diseases of the Nervous System," published in 1893, stated that "suppuration occurs in the cerebrum four times as frequently as in the cerebellum, and is very rare in the pons and medulla oblongata." He found only 3 abscesses of the pons and 1 abscess of the medulla in 231 abscesses of the brain. Lichtenstein and Zeitlin[2] stated that "according to Cassirer, LeFort and Lehmann found only six cases [of pontile abscess] among 458 [abscesses of the brain]." They reported 2 pontile abscesses found in 45 abscesses of the brain in 7,349 necropsies at the Cook County Hospital in six and one-half years and contended that many pontile abscesses are actually tuberculomas, while others are metastatic pyogenic foci.

The present case, like the other 11 cases of true pontile abscess recorded in the literature, is notable not only because the condition is rare but also as an illustration of its characteristic polymorphous clinical picture.

REPORT OF A CASE

First Admission.—History: K. H., a white girl aged 7½ years, was admitted to the St. Cloud Hospital on May 2, 1936, with the complaint of aching of the right ear, which started several days earlier, during the course of lobar pneumonia. Her pneumonia had ended by crisis on May 1, the day preceding her admittance to the hospital. Also, on the day of the pneumonic crisis, the right ear drum had ruptured and drained pus. Pain decreased at first, but later both it and the fever increased. Her family history was devoid of significant facts. Although she had had three previous attacks of pneumonia, she had had none of the infectious diseases of childhood.

Physical Examination: The pulse rate was 120, the respiratory rate 20 and the temperature 101 F. The right ear drum was red and bulging. The right mastoid was painful and tender to pressure. The left ear drum was normal. Except for hypertrophic tonsils and adenoids, the nose and throat were normal. Some moist rales were found in the lower lobe of the left lung posteriorly. In all other respects, physical examination failed to reveal any abnormalities. A roentgenogram showed cloudiness of the cells of the right mastoid process.

Clinical Course: As a result of the recent pneumonia, myringotomy of the right drum was performed without general anesthesia. Hot wet packs were applied. Discharge from the right ear remained profuse, but the tenderness over

Read before the Minnesota Academy of Ophthalmology and Otolaryngology, St. Paul, Nov. 12, 1937.

1. Gowers, W. R.: A Manual of Diseases of the Nervous System, ed. 2, London, J. & A. Churchill, 1893, vol. 2, p. 473.

2. Lichtenstein, B. W., and Zeitlin, H.: Pontile Abscess, J. A. M. A. **106:** 1057-1060 (March 28) 1936.

the mastoid disappeared. The temperature returned to normal, and the rales disappeared. The patient was discharged from the hospital on May 8.

Second Admission.—On June 2, she was readmitted to the hospital, having complained of severe pain over the right mastoid for several days. The pain was steadily increasing, and tenderness over the mastoid was marked. The temperature was 100 F. A roentgen examination demonstrated cloudiness and destruction of the cells of the right mastoid process. Simple mastoidectomy was performed on June 3. The cells were filled with granulations and free pus. These and necrosed bone over the transverse sinus and the dura were removed. Recovery was uneventful, and the patient was discharged with a normal temperature on June 8.

Third Admission.—History: Again, on June 22, she was readmitted, this time with a history of diplopia and projectile vomiting. These symptoms had been present for three days. Her mother stated that the patient had complained of intense headaches most of the time since leaving the hospital.

Physical Examination: The patient was stuporous and responded poorly during her examination. Both pupils reacted equally to light and in accommodation. The right pupil was slightly larger than the left. Movements of both eyes upward, downward and to the left were normal. She could not, however, move either eye to the right, but convergence was normal. Ophthalmoscopic examination revealed normal fundi. Slight nystagmus to the left was present. There was a minor drooping of the right side of the face, and the tongue protruded; yet she could move her tongue and change her facial expression without any definite evidence of paralysis. Movements and reflexes of the arms and legs were normal. There was a moderate amount of purulent discharge from the right ear and a smaller amount from the mastoidectomy wound, which was nearly closed.

Laboratory Examination: Spinal puncture disclosed a normal pressure of the fluid. The Queckenstedt test failed to show increased pressure. The spinal fluid showed 8 white cells per cubic millimeter and a faint trace of sugar and globulin, but no bacteria. The blood study showed 4,200,000 red blood cells, with 80 per cent hemoglobin, and 10,200 white blood cells.

Operation: The following morning, June 23, with a tentative diagnosis of petrositis and abscess of the brain, the mastoidectomy wound was reopened, and granulations and cells toward the petrous tip were curetted out. All bone was found to be healthy and hard. No fistulas were found.

Clinical Course: During the night following this surgical procedure, the patient became comatose; respirations were irregular and labored, and the pulse became rapid, though of a fair quality. The left arm and leg became rigid, but the pupils continued to react to light. Approximately each half-hour the breathing improved and then grew rapid, shallow and labored. Later the patient moved both legs and the right arm, yet the left arm continued limp and paralyzed. The temperature increased to 105.4 F., the pulse rate to 144 and the respiratory rate to 42, and shortly afterward the patient became cyanotic and died.

Necropsy.—Examination, of the head only, showed the brain coverings unchanged except at the site where the dura was exposed at operation, and there it was thickened, hyperemic and fibrin covered. The brain proper contained no focal lesions. The right half of the pons was twice the size of the left half. The right half was pale white, and in it a deep-seated abscess was found. On section, the area of softening and necrosis was found to be 1 by 2.7 cm. Besides this one area, there were multiple small abscesses scattered throughout the pons. Microscopic examination revealed necrosis, cavitation and leukocytic accumulations, a typical pyogenic abscess.

COMMENT

The abscess of the pons was not a direct bony extension from the mastoid. No evidence of any meningeal inflammation was apparent. The abscess was probably due to the pneumonia and not the sequel of mastoiditis. Because of the basilar and vertebral arterial and venous circulation of the pons, retrograde thrombosis should be excluded, as it was, by absence of evidence of it at postmortem examination.

Also of interest was the simultaneous involvement of the right external and the left internal rectus muscle. The right sixth nerve and part of the nucleus of the third nerve, supplying the left internal rectus muscle for gaze to the right must have been involved. The nucleus of Perlia of the third nerve was not disturbed, since convergence was present. The slight mydriasis on the right pointed to involvement of the trigeminal nerve.

Paralysis of the lateral gaze denotes chiefly an intrapontile lesion. The nucleus of the sixth nerve is controlled by the opposite pyramidal tract, originating in the cortex. Fibers pass up from the nucleus of the sixth nerve by way of the posterior bundle to the nucleus of the third nerve. Some fibers pass from the nucleus of one third nerve to the nucleus of the third nerve on the opposite side. Fibers from the nucleus of the third nerve supply the internal rectus muscle. Thus, a lesion in the pons causes homolateral paralysis of the sixth nerve, with contralateral paralysis of the nucleus of the internal rectus muscle.

An abscess of the pons or one in the middle lobe of the cerebellum can cause anemia of the surrounding brain tissue, with consequent softening. Moreover, such an abscess can cause internal hydrocephalus just as can a tumor in the same situation. This patient's severe headaches may have been due to increased intracranial pressure, which did not manifest itself by increased spinal fluid pressure because of the position of the abscess and the resultant internal hydrocephalus. Death was caused by respiratory failure resulting from pressure of the abscess on the respiratory center.

CONCLUSIONS

A case of pyogenic pontile abscess is reported.

This is the twelfth case of true pontile abscess reported in the literature.

The clinical picture of a pontile abscess depends on the localization of the abscess, its size, its involvement of different nuclei and its pressure on other nuclei or parts of other nuclei.

New Instruments

INSTRUMENTS FOR USE IN LARYNGOFISSURE

MERVIN C. MYERSON, M.D., NEW YORK

The instruments presented have proved of value in simplifying the operation of laryngofissure for cancer of the larynx. They are as follows:

1. A special rotary saw blade.
2. A special elevator.
3. A pair of three-pronged sharp retractors.
4. A pair of double-ended blunt retractors.
5. A heavy rectangular punch.
6. A straight and a right-angled hemostat.
7. A pair of curved, angular cutting scissors.
8. An angular knife for cutting through cartilage.

The saw blade is approximately 6 mm. in diameter. It is designed for use with a special hand motor and is employed for cutting through the center of the thyroid cartilage with facility and precision. When used, the blade penetrates the cartilage but does not cut through the internal perichondrium and soft tissues.

The elevator is used for two purposes, to ascertain whether the cartilage is completely severed and to elevate the internal or the external perichondrium.

The three-pronged sharp retractors are insinuated between the two halves of the thyroid cartilage, between the cartilage and perichondrium. When so placed they will not tear the cartilage. These retractors are used to separate the two halves of the cartilage so that the soft tissues may be incised.

The double retractors have at one end a rounded blade similar to an eyelid retractor and at the other end a flat blade at a right angle to the shaft, which is similar to the Freer submucous retractor. The rounded end is used for retraction of the alae. For this purpose it is placed on the lateral aspect of the thyroid notch, after the anterior structures of the soft tissue have been cut through. This placement of the retractor keeps it out of the field of operation. The flat end is used for retracting the external perichondrium and soft tissues from the cartilage, to facilitate whatever instrumentation may be required.

The punch is a specially heavy instrument designed to crush the tissues in the line of excision of the cartilage and other structures which bear the carcinoma. Whenever possible the punch removes these structures with a single stroke. If the cartilage is ossified and difficulty is encountered, the tissues are first crushed by the punch and straight and specially curved scissors then used

Fig. 1.—Special rotary saw blade.

Fig. 2.—Special elevator.

Fig. 3.—Three-pronged sharp retractors.

Fig. 4.—Double-ended blunt retractors.

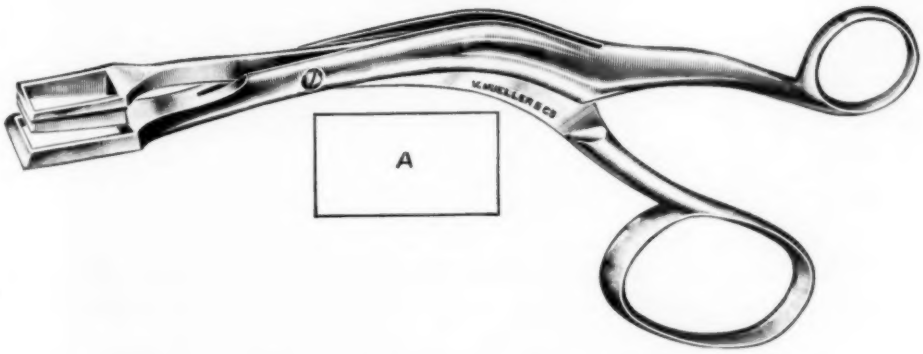

Fig. 5.—Heavy rectangular punch. The rectangle, *A*, shows the actual size of the cartilage removed.

to cut through the crushed area. This insures hemostasis. The punch removes a piece of tissue approximately 14 by 24 mm.

The straight and the right-angled hemostat are used to crush the soft tissues preliminary to excision when the underlying cartilage is to be separately removed.

Fig. 6.—Straight (above) and right-angled (below) hemostat.

Fig. 7.—Curved, angular cutting scissors.

Fig. 8.—Angular knife for cutting through cartilage.

The scissors curved at an angle are used for cutting from above in order to sever the cancer-bearing structure of the soft tissue when it has already been detached above and below.

The angular knife is used for cutting through the cartilage from above when the cartilage is to be removed as a preliminary to excision of the cancer-bearing area.

Progress in Otolaryngology

Summaries of the Bibliographic Material Available in the Field of Otolaryngology

---

PLASTIC SURGERY, 1938

ROBERT H. IVY, M.D., D.D.S.
AND
HENRY A. MILLER, M.D., D.D.S.
PHILADELPHIA

Plastic surgery has its roots in general surgical practice and is modified to meet local needs in various parts of the body. Its literature originates in several main channels, particularly general surgery, military surgery, and ophthalmologic, otolaryngologic and oral surgery. This summary is based on the literature of 1938 derived from these sources, arranged under topical or regional anatomic headings.

SCOPE OF, INDICATIONS FOR AND LIMITATIONS OF PLASTIC SURGICAL INTERVENTION

Straith and DeKleine [1] studied the role of plastic operations on children particularly from a psychologic point of view. Congenital defects such as harelip, cleft palate, lop ears and webbed fingers and various acquired deformities not only carry with them functional disabilities and cosmetic peculiarities but may have a retarding and deleterious effect on the child's mental and social development. These considerations suggest that plastic correction should be undertaken as soon as it is possible in children.

Wodak [2] contributes a detailed analysis of the esthetic and psychologic aspects of plastic surgery.

Among adults some become hypersensitive about minor defects of the face and nose and feel such blemishes to be the objects of scorn and ridicule on the part of others. This transference of the feeling of

---

1. Straith, C. L., and DeKleine, E. H.: Plastic Surgery in Children: The Medical and Psychologic Aspects of Deformity, J. A. M. A. **111**:2364 (Dec. 24) 1938.

2. Wodak, E.: Die ästhetischen und psychologischen Grundlagen der Nasen-, Ohren- und Gesichtsplastik, Monatschr. f. Ohrenh. **72**:288 (March); 424 (April); 490 (May) 1938.

inferiority to facial blemishes must be evaluated in considering possible plastic operations. The problem is discussed in a paper by King.[3]

Macomber [4] has made a survey of the recent developments in plastic surgery with particular reference to incisions in nasal surgery, operations for harelip or cleft palate and skin grafts.

Beck and Guttman [5] present a survey of the outstanding papers on plastic surgery published between 1933 and 1938.

Palmer [6] feels that there has been inadequate reporting of complications following rhinoplasty. The chief value of such reports is to stress the need of careful preoperative preparation of the patient from both physical and mental points of view. The complications include the following types:

1. Infections, local or distant . . .
2. Structural or mechanical complications . . .
3. Circulatory complications . . .
4. Psychic complications . . .

Case histories are appended to illustrate the various conditions.

Spaeth [7] presents a survey of modern methods and especially the indications for skin grafts, pedicle grafts and bone grafts for correction of defects of the orbit and face.

The increase in the number and speed of motor-driven vehicles has brought a host of injuries to the faces and jaws of passengers and drivers. Pearlman [8] and also Lang [9] describe the general early care of such injuries and outline the possibilities offered by plastic surgery for functional and cosmetic restorations.

Bérard, Colson and Dargent [10] summarize from their experiences with extensive carcinoma of the buccofacial region the following general recommendations: Metastases to lymph nodes, particularly from malig-

3. King, E.: Plastic Surgery of the Nose and Face, J. Med. **19**:348 (Sept.) 1938.

4. Macomber, D. W.: Recent Developments in Plastic Surgery, Rocky Mountain M. J. **35**:532 (July) 1938.

5. Beck, J. C., and Guttman, M. R.: Recent Advances in Plastic and Reconstructive Surgery of the Ear, Nose and Throat, Am. J. M. Sc. **196**:875 (Dec.) 1938.

6. Palmer, A.: Complications Following Rhinoplasty, Arch. Otolaryng. **28**: 538 (Oct.) 1938.

7. Spaeth, E. B.: A Review of Some Modern Methods for Ophthalmic Plastic Surgery, Am. J. Surg. **42**:89 (Oct.) 1938.

8. Pearlman, R. C.: Some New Developments in the Application of Plastic Surgery to Accident Cases, Kentucky M. J. **36**:30 (Jan.) 1938.

9. Lange, W. A.: Plastic Surgery in Relation to Motor Accidents, J. Michigan M. Soc. **37**:787 (Sept.) 1938.

10. Bérard, L.; Colson, and Dargent, M.: Indications et limites du traitement chirurgical dans les cancers étendus de la région bucco-faciale, Lyon chir. **35**:318 (May-June) 1938.

nant growths of the buccofacial region, should be excised surgically. For tumors of the buccofacial cavity, of the tongue and of the tonsils, roentgen or radium irradiation is the treatment of choice. Those of the maxilla and the mandible, involving bone, cannot be treated by ordinary doses, and if sufficient radiation is used the necrosis and cicatrization of bone which follow are so objectionable that radical operation is preferable. The authors present photographs of 3 patients treated by extensive surgical intervention and prosthetic restoration. They have found gastrostomy, ligation of the external carotid artery and local nerve block the best method of approach in the surgical removal of malignant growths of the buccofacial region.

From an educational point of view there has been considerable clarification of ideas about the training a young man should have who is planning to enter the practice of plastic surgery. The American Board of Plastic Surgery has completed its organization, has written some recommendations concerning preliminary training leading to certification by examination and has taken up the problem of residencies in this field.

METHODS OF SKIN GRAFTING

The pedicle skin graft has a factor of viability which often is amazing. Sparrow [11] reports successful skin grafting of the rectum by the use of this type of graft, while Davis [12] presents a step by step exposition of the treatment of an extensive and poorly healed burn of the scalp, in which a delayed pedicle skin graft was utilized for restoration with an exceptionally fine end result.

Macomber [4] lists the limitations of pedicle tubed flaps as follows:

> 1. The tube must not be too long; in general, the tissue comprising it must be at least one-third as wide as long. 2. Too much fat . . . will cause eversion of skin edges, tension, lymph stasis and death of tissues. 3. Too little fat lacks sufficient circulation to nourish the overlying skin. . . . 4. The tube must not be close to, and never cross, the midline. . . . 5. More than a small amount of pressure on postoperative dressings may cause thrombosis within vessels of the tube, with subsequent necrosis. 6. Too early transfer will prove hazardous; a minimum of three weeks should be observed. . . . 7. It is impractical to take much untubed tissue around the mobilized end. . . . 9. The very young and very old are ill-adapted to . . . [this method].

According to Brown [13] the early treatment of raw surfaces is to clear up the area before damaging contracture occurs. Surgical drainage

---

11. Sparrow, T. D.: Viability of the Tube Pedicle Skin Graft, Am. J. Surg. **41**:92 (July) 1938.

12. Davis, W. B.: Value of Delayed Single Pedicle Skin Flaps in Plastic Repair of the Scalp, Surg., Gynec. & Obst. **66**:899 (May) 1938.

13. Brown, J. B.: Covering of Raw Surfaces, Internat. Abstr. Surg. **67**:105, 1938; in Surg., Gynec. & Obst., August 1938.

is best accomplished by the use of saline dressings. Granulations are kept flat by pressure dressings. Brown uses thick split grafts, sewed in place, extensively.

With some acute burns the patient's life is in the balance. Bettman [14] feels that resorting to homologous grafts aids in cutting down the loss of body fluids and reduces sepsis even though the grafts disappear in a few weeks. Occasionally, as a life-saving measure, implantation of these grafts is well worth considering, but as a permanent operative procedure it is not successful, as the grafts seem never to take and spread as does skin from the patient's own body.

Blair and Byars [15] studied the late stages of burns in 340 cases and found that the average time between injury and the inaugurating of surgical repair was five and one-tenth years. In such cases active surgical repair should be instituted as early as possible in the healing process. The time can be evaluated from the degree of the burn. Second degree burns heal equally well regardless of the size, while with third degree burns healing is relative to the square of the diameter.

Pinch grafts bear trauma poorly, often become ulcerated and do not heal readily. Danzis, Friedman and Levinson [16] report 2 cases in which extensive scars treated by this method with functionally unsatisfactory results underwent carcinomatous change ten and fifteen years, respectively, after pinch grafting. Garlock [17] reports a recurrent carcinoma in a scar from a burn which responded successfully to treatment by radical incision and sliding flaps.

Transplanted skin gradually acquires sensation. McCarroll [18] carried out some observations and reports:

> . . . In split thickness grafts, . . . regeneration . . . occurs over all parts of the graft simultaneously. . . . The same holds true in the majority of free full thickness grafts . . . in pedicle flaps . . . regeneration takes place first along the proximal border and the portion attached first, progressing . . . slowly over the body of the graft.
>
> . . . Generally . . . regeneration is more rapid in split thickness grafts. . . . Next . . . is the free full thickness graft, and slowest . . . is the pedicle flap.

---

14. Bettman, A. G.: Homogenous Thiersch Grafting as a Life Saving Measure, Am. J. Surg. **39**:156 (Jan.) 1938.

15. Blair, V. P., and Byars, L. T.: Treatment of Wounds Resulting from Deep Burns, J. A. M. A. **110**:1802 (May 28) 1938.

16. Danzis, M.; Friedman, M., and Levinson, L. J.: Carcinoma Developing on Extensive Scars: Inefficiency of Pinch Grafts as a Prophylactic Measure, Am. J. Surg. **41**:304 (Aug.) 1938.

17. Garlock, J. H.: Recurrent Epithelioma of the Arm, J. Mt. Sinai Hosp. **5**:75 (July) 1938.

18. McCarroll, H. R.: Regeneration of Sensation in Transplanted Skin, Ann. Surg. **108**:309 (Aug.) 1938.

The restored sensation can equal that of the surrounding skin. McCarroll states, "The size of the graft . . . apparently was not a factor in the rate of regeneration," but the condition of the bed was. The free grafts show good regeneration in about four months, and the pedicle grafts take about eight months.

Haggland [19] found a dental hooked explorer a handy instrument in handling small grafts. Harris [20] reports a case of skin grafting of the tonsillar bed to prevent contracture of the scar in a singer.

PLASTIC OPERATIONS ON THE FACE

The treatment of fresh wounds is analyzed by Reid and Stevenson [21] as presenting essentially a problem in the aid of the activity and growth of living cells. They discuss the scientific contributions which are susceptible of practical application. These include asepsis in the operating room, control of hemorrhage, realization that for six to eight hours bacteria may be considered as on the surface of the wound and amenable to removal by thorough irrigation with physiologic solution of sodium chloride, supplemented in wounds involving excessive traumatism by débridement.

Gillies [22] summarizes the primary treatment of facial injuries along these lines. Similar papers are contributed by Phillips [23] and Osborn.[24]

According to Gillies, in débridement no cartilage or bone should be removed because of fragmentation. Often a part entirely cut off can be sutured back carefully, and healing will occur. The immediate care of the soft parts requires prolonged careful washing, with removal of all debris, débridement of only definitely devitalized tissues and accurate suturing of the edges. In addition there are often underlying bony fractures and displacements which must be recognized and corrected as soon as the physical condition of the patient permits. For mandibular fractures Risdon [25] presents a new, efficient method of wiring, which

19. Haggland, P. B.: Instrument for Pinch Grafting, Am. J. Surg. **39**:171 (Jan.) 1938.

20. Harris, H. I.: Advantages of Split Skin Graft Following Tonsillectomy, Ann. Otol., Rhin. & Laryng. **47**:1045 (Dec.) 1938.

21. Reid, M. R., and Stevenson, J.: Treatment of Fresh Wounds, Internat. Abstr. Surg. **66**:313, 1938; in Surg., Gynec. & Obst., April 1938.

22. Gillies, H. D.: Primary Treatment of Facial Injuries, Practitioner **140**: 414 (April) 1938.

23. Phillips, W. P.: Lacerations of Face and Scalp, Dallas M. J. **24**:41 (March) 1938.

24. Osborn, C. H.: Management of Facial Injuries, M. J. Australia **2**:41 (July 9) 1938.

25. Risdon, F.: Surgical Treatment of Facial Injuries, Canad. M. A. J. **38**:33 (Jan.) 1938.

consists of placing a bronze wire around the second molar tooth and then twisting it into a strand. This is done on both sides, and the two wires are joined by twisting together in the region of the anterior incisor. This twisted wire arch is then fastened to the individual teeth and can be used as a support for fixation and immobilization of the lower jaw in dental occlusion to reduce fractures of the jaw.

Depressed fractures of the maxilla are handled by placing cast splints on both jaws, with intermaxillary wiring. Depression of the antral wall and the orbital rim is corrected by opening the antrum and packing with iodoform gauze to support the parts until fibrous union starts.

Blair, Brown and Byars [26] also contribute a detailed analysis of the procedures available for handling fractures of the alveolar bone or the jaw and the various maxillary fractures with antral involvement and orbital depression.

Gingrass [27] uses a modified Barton bandage consisting of a surgeon's head cap with a rubber dam around the chin for immediate temporary stabilization of fractures of the jaw. He feels that 90 per cent of all fractures of the jaws can be cared for by the eyelet, or arch wire, method of interdental wiring.

An operation for the correction of receding chin is discussed by Safian,[28] who cites 4 cases in which ivory transplantation was successful. Maliniac [29] believes that dermal grafts are the implants of choice in building out the prominence of the chin.

Esser [30] uses an entirely different method. An incision is made under the chin and a pocket made, into which is fitted a stent of modeling compound covered with a skin graft. When healing is complete a communication is made from the mouth, and a dental plate is constructed which extends down into the epithelized pocket to build out the chin.

Esser [30] also reports the successful correction of "bird face" by resecting a part of the maxilla and pushing it back into a more harmonious relation with the rest of the face.

The disfigurement resulting from radical operations on the frontal sinuses can be corrected by implantation of cartilage secured from the

---

26. Blair, V. P.; Brown, J. B., and Byars, L. T.: Prevention and Correction of Facial Disfigurement, Am. J. Surg. **42**:536 (Dec.) 1938.

27. Gingrass, R. P.: Early Management of Facial Injuries, J. Am. Dent. A. **25**:693 (May) 1938.

28. Safian, J.: Receding Chin: Plastic Reconstruction, New York State J. Med. **38**:1331 (Oct. 15) 1938.

29. Maliniac, J. W.: Reconstruction of Deformed Chin in Its Relationship to Rhinoplasty, Am. J. Surg. **40**:583 (June) 1938.

30. Esser, J. F. S.: Correction of Bird's Face, Am. J. Orthodontics **24**:791 (Aug.) 1938.

eighth and ninth ribs of the patient to fill out the depression, as described by Foster,[31] or by the use of isografts, as advocated by O'Connor.[32]

Paralysis of the facial nerve following mastoidectomy for which nerve grafting is not feasible can be improved from an esthetic point of view by bringing down fasciculi of the temporal muscle and sewing them into the peribuccal muscles, as described by Coelst [33] and also by Halle.[34]

The ectropion associated with paralysis of the seventh nerve is corrected best by the Kuhnt-Szymanowski operation, which is discussed and illustrated in a paper by Weeks.[35]

The injuries to the jaw and face occurring among the infantry, air corps and civilians during war are discussed by Parrott,[36] with remarks on the general management in such cases during the World War.

Other papers on injuries to the face include a report by Esser [37] of a burn caused by roentgen radiation in a patient who was being treated for hypertrichosis. Unfortunately, postoperative embolism terminated the plastic restorations, which were being carried out by means of pedicle flaps.

Malignant growths of the antrum and the alveolar processes are usually treated best by combined surgical intervention and irradiation. Such procedures may result in some retraction and elevation of the upper lip. In some cases there may also be an external perforation. For labial contracture, the buccoalveolar fold is dissected free and skin grafted by use of a stent of modeling compound. The external perforation can be made inconspicuous with a tinted prosthesis during observation, for one year, and closure then carried out by means of a pedicle flap lined with free skin, according to Figi.[38]

---

31. Foster, B.: Extreme Disfigurement Resulting from Operation on Frontal Sinus Corrected with Graft of Rib Cartilage, Australian & New Zealand J. Surg. **8**:82 (July) 1938.

32. O'Connor, G. B.: Contour Reconstruction After External Frontal Sinus Operation, Ann. Otol., Rhin. & Laryng. **47**:183 (March) 1938.

33. Coelst: Paralysie faciale consécutive à un accident opératoire, Rev. de chir. structive **8**:107 (Aug.) 1938.

34. Halle, M.: Occurrence of Facial Paralysis and Methods for Its Correction, Laryngoscope **48**:225 (April) 1938.

35. Weeks, W. W.: Ectropion and Entropion of the Eyelids, Am. J. Surg. **42**:78 (Oct.) 1938.

36. Parrott, A. H.: Jaw and Facial Injuries in War Time, Proc. Roy. Soc. Med. **32**:53 (Nov.) 1938.

37. Esser, J. F. S.: Serious Case of Röntgen Necrosis of the Face and Mandible, Rev. de chir. structive **8**:1 (May) 1938.

38. Figi, F. A.: Plastic Repair After Removal of Extensive Malignant Tumors of the Antrum, Arch. Otolaryng. **28**:29 (July) 1938.

Wirth [39] reports 2 cases of radical inferior cheiloplasty according to the technic described by Martin in 1932, with complete eradication of the carcinoma and a good cosmetic and functional end result.

PLASTIC OPERATION ON THE NOSE

"Guest passenger" accidents are becoming common in the present days of high speed motoring and traffic congestion. These accidents occur to the person in the right front seat, who is thrown against the dashboard and windshield. Straith and DeKleine [40] have written a collective review of the modern management of the fractured nose. In addition to the lacerations and contusions of the soft tissue, these accidents may also cause depressed fractures of the malar and frontal bones and transverse fractures of the maxilla, with possible orbital and cranial complications.

For the soft tissues, Straith and DeKleine recommend early careful cleansing, with conservative débridement. No bony fragments are ever removed. Actual losses of skin are restored immediately by grafts from orbital or postauricular donor areas. All sutures, if possible, are subcuticular. Nasal fractures are repositioned in the overcorrected position and the parts stabilized by an external device designed by Straith for the purpose.

Old fractures and deformities of the nose may often be improved by surgical intervention. The following defects are included, according to the authors:

1. Defects due to loss of supporting elements, as the saddle nose deformity, which can be corrected by grafts of autogenous cartilage or preserved isografts.

2. Defects producing excessive dimensions, such as exostosis and widening of the nose by spreading of the nasal bones.

3. Lateral deviations.

Both 2 and 3 are correctible by appropriate intranasal operations.

Gerrie [41] reports 100 cases of broken nose. Eighty-three of the patients were males, and 17 were females. The predominant causes were athletic activities and fights. Pathologically two general types were noted: the laterally impacted type (85 per cent), in which the blow is from the side, and vertically impacted, or depressed, type (15 per

39. Wirth, J. E.: Radical Inferior Cheiloplasty for Advanced Carcinoma of the Lower Lip, Northwest Med. **37**:109 (April) 1938.

40. Straith, C. L., and DeKleine, E. H.: Modern Management of the Fractured Nose: Collective Review, Internat. Abstr. Surg. **66**:9, 1938; in Surg., Gynec. & Obst., January 1938.

41. Gerrie, J. W.: One Hundred Broken Noses, Canad. M. A. J. **39**:433 (Nov.) 1938.

cent). The author uses a modification of the Watson-Williams splint for stabilization of the parts and describes it fully.

Ibbotson [42] summarizes the modern methods of treating nasal fractures in England; in general the procedures are similar to those in vogue in the United States.

Cinelli and Cinelli [43] reporting on sources of cartilage available for the correction of saddle nose without recourse to implantation of ivory or costal cartilage cite cases wherein (1) auricular cartilage was utilized, (2) cartilage was secured by submucous resection, (3) cartilage was made available by an operation on the upper lateral cartilages of the nose and (4) hypertrophied alar cartilages were removed by resection.

Pierce and O'Connor [44] present a variety of problems in nasal reconstruction, giving photographs, sketches and outlines of treatment, with end results. In another paper [45] they report their experiences with 375 refrigerated cartilaginous isografts in five years. Their procedure is to strip the cartilage of its perichondrium and preserve it in one part of merthiolate solution (1:1,000) to four parts of sterile physiologic solution of sodium chloride. The grafts were from a few days to two years old when used.

Peer [46] made observations on the fate of human cartilage preserved in a 50 per cent solution of alcohol, transplanted under the skin and removed after differing intervals. For one month foreign body reactions were noted; for the next three months the grafts remained as tolerated dead foreign bodies; subsequently fibroblastic infiltration with some absorption of the cartilage was present.

Mowlem [47] noted some degree of distortion in 12 to 30 per cent of cartilaginous implants. He uses bone from the iliac crest instead and reports 36 cases. No absorption or change was noted in any, and in over 90 per cent the graft was fused with the underlying nasal bones. Macomber [4] also favors this material.

---

42. Ibbotson, W.: Treatment of Nasal Fractures, M. Press **197**:8 (July 6) 1938.

43. Cinelli, A. A., and Cinelli, J. A.: Saddle Nose, New Yor' State J. Med. **38**:977 (July 1) 1938.

44. Pierce, G. W., and O'Connor, G. B.: Reconstruction Surgery of the Nose, Ann. Otol., Rhin. & Laryng. **47**:437 (June) 1938.

45. O'Connor, G. B., and Pierce, G. W.: Refrigerated Cartilage Isografts, Surg., Gynec. & Obst. **67**:796 (Dec.) 1938.

46. Peer, L. A.: Cartilage Transplanted Beneath the Skin of the Chest in Man, Arch. Otolaryng. **27**:42 (Jan.) 1938.

47. Mowlem, R.: Use and Behavior of Iliac Bone Grafts in the Restoration of Nasal Contour: Clinical and Radiological Observations, Rev. de chir. structive 8:23 (May) 1938.

Thevenin [48] made a study of the causes of extrusion of cartilaginous implants, which he finds occurs in 2 to 3 per cent of cases. The causes related to operative technic are (1) postoperative hemorrhage and lack of firm contact between the graft and tissues because of faults in or absence of splinting and (2) failure to keep homografts scrupulously clean of any muscular or periosteal remnants.

In regard to the donor, Thevenin prefers a similar blood grouping. He warns against too early restorations following accidents. The skin must be clear of pimples and furuncles and the general condition good. General systemic diseases, such as diabetes, arthritis and syphilis may militate against good results.

Cohen [49] recommends a new approach for the insertion of nasal implants. He uses a vestibular incision near the tip of the nose following the outline of the lower border of the lower lateral cartilage. The advantages claimed are sterilization of the field and adequate postoperative protection from nasal secretions.

In repairing deficiencies of the nasal skeleton associated with falling in of the nose, Young [50] uses cartilage not only to replace the dorsal edge of the septum but to form alar extensions by means of lateral hinged wings; if necessary a hinged columellar post also is included.

Minor flattenings of the lower end of the nose can be corrected by eversion of the lower cartilages and suturing, as described by Maliniac in 1932. González Loza [51] has recently described a similar operation.

The severe saddle nose deformities of tertiary syphilis involve destruction of the mucosal lining of the nose as well as cartilaginous and bony losses. Gillies' [52] repair in such cases consists of the application of a skin graft on a stent to remake the lining of the nose. Access is gained through the labiogingival sulcus. Subsequent cartilaginous implants or prosthetic restorations aid in retaining the nose in a normal position.

---

48. Thevenin, J.: Causes d'intolérances des inclusions cartilagineuses, Rev. de chir. structive **8**:7 (May) 1938.

49. Cohen, S.: A New Approach for Nasal Implants, Ann. Otol., Rhin. & Laryng. **47**:1101 (Dec.) 1938.

50. Young, F.: A Principle to Be Considered in Transplanting Costal Cartilage for Repairing Deficiencies of the Nasal Skeleton, Ann. Surg. **108**:1113 (Dec.) 1938.

51. González Loza, M.: Método personal para la corrección sin injerto, de la nariz aplastada, Rev. méd. del Rosario **28**:388 (April) 1938.

52. Gillies, H.: Syphilitic Destruction of Nasal Contour: Restoration by Intranasal Skin Grafting, Rev. de chir. structive **8**:31 (May) 1938; Die Deformitäten der syphilitischen Sattelnase, Deutsche Ztschr. f. Chir. **250**:379, 1938.

An operation for restoration of a nasal tip by mobilization of tissues from the forehead is described by Hellenthal.[53]

Coelst [54] replaced a lost columellar strip successfully by excising a strip of mucosa from the upper lip and bringing it out to the under surface of the nose by an incision through the lip at the base of the nose.

The crooked nose must be analyzed to determine the essential defect. For defects of the upper third, Cinelli [55] has substituted for the Joseph operation a procedure consisting of a high resection of the dislocation of the septum, surgical dislocation of the nasal bones from their lateral attachments and reposition in the midline.

A new operation was devised by Tamerin [56] to correct external deviations of the lower end of the nose. The chief defect is asymmetry of the triangular cartilages. The triangular cartilage opposite the direction of the deviation is larger than its mate. To correct such a deformity, the triangular cartilages are split from their attachments to the septum and a triangular piece of cartilage and mucosa removed from the larger side and sutured in an overcorrected position with heavy silk.

Finochietto [57] presents an interesting case report of partial rhinoplasty, with follow-ups ten or fifteen and twenty-five years later. The photographs represent a continuously excellent result.

Childrey,[58] who had the opportunity of studying a recurrence of bony atresia of the choanae one year after operation, reports the case with the comment that if the posterior margin of the septum had been removed there would have been no recurrence.

Donnelly [59] reports on a 4 year old girl with congenital bony atresia of the choanae. He removed the obstructing plate and posterior vomerian wall and inserted a skin graft on a catheter. The operation was successful, and at a check-up eleven months later patency of the nasopharynx and improvement in both the breathing and the quality of the voice were noted.

---

53. Hellenthal: Ueber den plastischen Ersatz der Nasenspitze, Chirurg **10**:359 (May 15) 1938.

54. Coelst: Un cas de perte totale du lobule et de la sous-cloison, Rev. de chir. structive **8**:103 (Aug.) 1938.

55. Cinelli, A. A.: Crooked Nose, Laryngoscope **48**:760 (Oct.) 1938.

56. Tamerin, J. A.: A New Operation for Correction of External Deviations of the Lower End of the Nose, Ann. Otol., Rhin. & Laryng. **47**:235 (March) 1938.

57. Finochietto, E.: Rinoplastía: Resultado, 25 años después de la operación, Prensa méd. argent. **25**:897 (May 11) 1938.

58. Childrey, J. H.: Atresia of the Choana: Case Report, Laryngoscope **48**: 51 (Jan.) 1938.

59. Donnelly, J. C.: New Method of Operation for Congenital Atresia of the Posterior Nares, Arch. Otolaryng. **28**:112 (July) 1938.

Stenosis of the anterior nares, on the other hand, was successfully corrected by O'Connor [60] by an operation consisting of the dissection of a ring of the stenosed area and skin grafting according to a special technic.

Congenital relative atresia of the piriform orifice was corrected by Escat [61] by enlarging the osseous aperture of the nose through the labiogingival sulcus.

Kazanjian [62] describes his lateral pressure splint for the nose, which has been useful in his experience, while Firestone [63] presents an improved septal retractor and an offset nasal rasp. Childrey [64] has found that a no. 20 hypodermic needle may be threaded and used in intranasal suturing, for which curved needles are impractical.

PLASTIC OPERATIONS ON THE EARS

Reconstruction of the auricle is notoriously difficult. Padgett [65] summarizes the causes of failure, barring infection, as follows:

> . . . (1) the inability to obtain structural support of the proper size and shape, (2) the failure to obtain adequate covering of the proper thickness, texture, and color, (3) difficulty in maintaining the new auricle at an upright level in comparison with the opposite ear, (4) the development of an improper divergent angle of the auricle from the head, and, finally (5) a tendency for folding, shrinkage, and diminution in size.

Four cases of total reconstruction are reported, in 1 of which the observations extend over ten years.

In the first operation, the rudimentary cartilaginous masses are removed and discarded. The mastoid bone above and posterior to the future meatus is hollowed out to imitate a cavum, and this is lined with the remaining skin flaps. An appropriate piece of cartilage is removed in the usual manner from the eighth or the ninth rib and fashioned. After extensive undermining, the cartilage is inserted through a small incision posterior to and above the ear, the wound closed and a pressure bandage applied. Along the side of the neck a flap is raised and tubed. Its lower end is split so that the wider piece will be adequate to cover

---

60. O'Connor, G. B.: Reconstruction of the Anterior Nares Following Stenosis, Rev. de chir. structive **8**:77 (Aug.) 1938.

61. Escat, M.: De l'atrésie congénitale de l'orifice piriforme, cause d'insuffisance respiratoire: Sa correction chirurgicale, Oto-rhino-laryng. internat. **22**: 65 (Feb.) 1938.

62. Kazanjian, V. H.: Lateral Pressure Splint for the Nose, Arch. Otolaryng. **27**:474 (April) 1938.

63. Firestone, C.: Two Improved Instruments for Use in Plastic Surgery of the Nose, Laryngoscope **48**:365 (May) 1938.

64. Childrey, J. H.: Simplified Intranasal Suture, Arch. Otolaryng. **27**:618 (May) 1938.

65. Padgett, E. C.: Total Reconstruction of the Auricle, Surg., Gynec. & Obst. **67**:761 (Dec.) 1938.

the posterior part of the ear and the narrow one, about 12 cm. long and 1 cm. wide, will become the helix.

Two months later an incision is outlined posterior to the buried cartilaginous mass, which is then turned forward. The posterior edge of the cartilage is trimmed. The wide tube is brought up, attached to the scalp above the ear and folded out to cover the posterior surface of the cartilage. The end of the small tube is attached to the upper end of the ear, and this is slowly unrolled at different periods to form a helix. The raw area overlying the temporal bone posterior to the ear is covered with a split thickness graft overlying a splint of modeling compound.

Five weeks later the lower part of the tubes are severed, unused parts replaced and general adjustments made.

Dufourmentel [66] describes a similar operation but does not use modeled cartilages. Other methods, such as that described by Pierce, have been successfully used, and recently Money [67] has reported his experiences with this method. Repair after partial loss of an auricle by using a tube flap from the arm was reported by Thomas.[68]

The outstanding, or "lop," ear is ascribed by MacCollum [69] to congenital overgrowth of the conchal cartilage and failure of the antihelix and scapha to form.

The requirements of operation are as follows:

> 1. The angle formed between the ear and the mastoid region must be reduced to at least 30 degrees. 2. The convolutions of the cartilages must be shaped to form an antihelix and a scapha. . . . 3. The skin incision must be hidden. . . .

The general operative procedure consists in postauricular excision of a crescent of cartilage and skin, suitable suturing and postoperative stabilization during healing.

Hindmarsh [70] presents case reports of such aural deformities treated by a similar operation, while Ehrenfeld [71] has modified the excision of cartilage by excising three small semicircles low down near the postauricular sulcus.

The closure of a persistent postoperative fistula in the mastoid is most successful if the cavity can be obliterated completely and the skin

---

66. Dufourmentel, L.: Reconstitution du pavillon de l'oreille, Rev. de laryng. **59**:517 (May) 1938.

67. Money, R. A.: Reconstruction of the External Ear, M. J. Australia **1**:819 (May 7) 1938.

68. Thomas, C. H.: Repair for Partial Loss of the Auricle, J. Laryng. & Otol. **53**:259 (April) 1938.

69. MacCollum, D. W.: Lop Ear, J. A. M. A. **110**:1427 (April 30) 1938.

70. Hindmarsh, J.: Treatment of Deformities of the Ear, Nord. med. tidskr. **16**:1178 (July 23) 1938.

71. Ehrenfeld, H.: Die kosmetisch-operative Anlegung der abstehenden Ohren, Zentralbl. f. Chir. **65**:1236 (May 28) 1938.

closed tightly over it. Copps and McCormick [72] have devised an operation to fulfil these requirements. They extend the upper end of the posterior incision backward and slightly up for a distance of 2.5 cm., dissecting off the skin from a projected quadrilateral area and raising a subcutaneous tissue flap, attached at one end, the free end of which is turned into the fistula to obliterate it. The skin is then closed over it.

Coelst's [73] patient had had several plastic operations in an attempt to close a large postauricular cavity. It was found more feasible to transfer the opening into the concha by making an appropriate window in the latter and suturing it around the edges to the epithelized tissue of the cavity.

PLASTIC OPERATIONS ON THE LIPS, PALATE, LARYNX AND NECK

Observations based on extensive personal experience in surgical correction of cleft palate have been published by Callister,[74] Owens [75] and Penn.[76] Axhausen [77] has written a new paper on his highly successful three layer method of closure for cleft palates. Brenizer [78] has been using fascia and ribbon catgut across harelip and cleft palate wounds to relieve tension at the suture lines. Coelst [79] has extended the diversified uses of his celluloid sheet method to protecting harelip suture wounds from contamination, and giving an even healing surface to the wound.

Stumpf [80] uses the Brophy-Frew three stage method and advocates it warmly. While most operators close the lip over the projecting premaxilla in cases of bilaterally cleft palate, Stumpf feels that the closure of the alveolar ridge should receive first attention and that that structure should be manually replaced in a normal position before closure of the lip is undertaken.

---

72. Copps, L. A., and McCormick, G. L.: Closure of Persistent Postoperative Mastoid Fistula with a Subcutaneous Pedunculated Flap, Arch. Otolaryng. **27**: 472 (April) 1938.

73. Coelst: Un cas d'ouverture permanente consécutive à un évidement pétro-mastoïdien, Rev. de chir. structive **8**:113 (Aug.) 1938.

74. Callister, A. C.: Congenital Defects of Nose, Lip and Palate, Rocky Mountain M. J. **35**:698 (Sept.) 1938.

75. Owens, N.: Some Observations on the Repair of Cleft Lip, South. M. J. **31**:959 (Sept.) 1938.

76. Penn, J.: Treatment of Hare-Lip and Cleft Palate, South Africa M. J. **12**:425 (June) 1938.

77. Axhausen, G.: Die Hasenschartenoperation, Chirurg **10**:1 (Jan. 1) 1938.

78. Brenizer, A. G.: Use of Fascia and Ribbon Catgut in the Repair of Cleft Palate and Harelip, Ann. Surg. **107**:692 (May) 1938.

79. Coelst: De l'emploi du celluloïd dans l'opération du bec de lièvre, Rev. de chir. structive **8**:99 (Aug.) 1938.

80. Stumpf, F. W.: Cleft Lip and Palate Corrections, J. Am. Dent. A. **25**: 1196 (Aug.) 1938.

One of the most difficult objectives in surgical correction of harelip is to secure a normal nostril on the affected side. McIndoe [81] has described his technic of freeing the flattened ala sufficiently to readjust the parts in a normal relation.

Flattening of the nostril may be a conspicuous defect in cases of secondary harelip. Humby [82] turns over a strip of alar cartilage from the normal and usually prominent side to equalize the two alae. In such cases Douglas [83] has raised the nasal floor and advanced the nasolabial fold by making a semilunar incision following the fold and making a pocket under the ala nasi. This is filled out with a button of cartilage of double thickness secured from the ears, and the ala is advanced medially by conversion of a U-shaped incision into a Y.

In the cases of laryngeal stenosis secondary to traumatic perichondritis or to irradiation for subglottic neoplasms or for chondroma of the cricoid, the removal of scar tissue, if followed by skin grafting, results satisfactorily, according to Negus.[84]

For the treatment of an adult with stenosis of the larynx due to an automobile accident, Looper [85] devised a swinging bone graft from the hyoid to fit into a thyroid chink for enlargement of the area.

Injuries to the jaw sustained in automobile accidents are often compound and occasionally present complex problems. Fractures near the angle of the mandible in the absence of posterior molar teeth are often complicated because of the difficulty of preventing the posterior fragment from riding up and settling in an abnormal position against the occlusal surface of the upper molar teeth. Ginestet [86] found that he could use a device on the homolateral arm as a point for traction by elastics attached to a hook at the angle of the mandible.

Fracture of the mandible in the premolar region on one side, a common injury, is often accompanied by fracture of the condyle of the opposite side. Thoma [87] has written a comprehensive review of the various types of condylar fractures and their treatment.

---

81. McIndoe, A. H.: Correction of Alar Deformity in Cleft Lip, Lancet **1**:607 (March 12) 1938.

82. Humby, G.: Nostril in Secondary Hare-Lip, Lancet **1**:1275 (June 4) 1938.

83. Douglas, B.: Plastic Surgery of the Nose with Report of Original Operation for Advancement of the Nasolabial Fold, South. M. J. **31**:1047 (Oct.) 1938.

84. Negus, V. E.: Treatment of Chronic Stenosis of the Larynx with Special Reference to Skin Grafting, Ann. Otol., Rhin. & Laryng. **47**:891 (Dec.) 1938.

85. Looper, E. A.: Use of the Hyoid Bone as a Graft in Laryngeal Stenosis, Arch. Otolaryng. **28**:106 (July) 1938.

86. Ginestet, G.: Réduction d'une fracture double du maxillaire inférieur par action combinée des forces intermaxillaires et d'une anse transosseuse, Rev. de stomatol. **40**:289 (May) 1938.

87. Thoma, K. H.: Traumatic Injury of the Condyloid Process of the Mandible, New England J. Med. **218**:63 (Jan. 13) 1938.

For temporomandibular arthrotomy Milch [88] has suggested a bayonet incision, which will give adequate exposure of the condylar head, will not be unsightly and will avoid such important structures as the facial and the auriculotemporal nerve.

The débridement of wounds associated with fractures of the mandible should not include fragments of bone. When judiciously immobilized and splinted the oral tissues have remarkable recuperative powers even in the face of infection. Golding [89] and also Weisengreen [90] have published case reports directing attention to this fact.

As a new method of immobilizing maxillary fractures, Major [91] recommends modification of the Kirschner wire method by putting a wire through the symphysis menti and connecting this with adjustable turnbuckles to a head cap.

Swellings of the neck in infants are often difficult to diagnose and sometimes on surgical exploration present surprising extensions and ramifications. Ladd and Gross [92] have written a scholarly paper on the etiology of congenital branchiogenic anomalies, their diagnosis and methods of surgical removal.

An excellent paper on the fasciae and the fascial spaces of the head, neck and adjacent regions has been published by Grodinsky and Holyoke,[93] of the department of anatomy of the College of Medicine of the University of Nebraska.

NEW BOOKS

The new books pertaining to plastic surgery published during 1938 include the following works: "Plastic Surgery," by A. J. Barsky; "The Surgery of Oral and Facial Diseases and Malformation," by G. V. Brown; a new edition (the second) of "Fractures of the Jaws," by R. H. Ivy and L. Curtis; "Surgical Diseases of the Mouth and Jaws," by E. C. Padgett; "A Manual of Reparative Plastic Surgery," by J. E. Sheehan, and "Bec-de-lièvre: Formes cliniques—Chirurgie," by V. Veau and J. Recamier.

---

88. Milch, H.: Bayonet Incision for Temporomandibular Arthrotomy, Am. J. Orthodontics **24**:287 (March) 1938.

89. Golding, H. S.: A Report on Three Cases of Fracture of the Lower Jaw Due to Gunshot Wounds in the Face During the Waziristan Operations, 1937, J. Roy. Army M. Corps **71**:50 (July) 1938.

90. Weisengreen, H. H.: Gunshot Fracture of the Mandible, Am. J. Surg. **40**:133 (Jan.) 1938.

91. Major, G.: Kirschner Traction in the Treatment of Maxillary Fractures, J. A. M. A. **110**:1252 (April 16) 1938.

92. Ladd, W. E., and Gross, R. E.: Congenital Branchiogenic Anomalies, Am. J. Surg. **40**:234 (Feb.) 1938.

93. Grodinsky, M., and Holyoke, E. A.: Fasciae and Fascial Spaces of the Head, Neck and Adjacent Regions, Am. J. Anat. **63**:367 (Nov.) 1938.

Abstracts from Current Literature

Ear

THYROXINE THERAPY IN OTOSCLEROSIS: REPORT OF FORTY-TWO CASES. MAX A. GOLDSTEIN, J. Laryng. & Otol. **53**:444 (July) 1938.

The basis of thyroxin therapy as explained by Gray was "to ascertain if, by producing an active congestion in the minute blood vessels in the organ of hearing in cases of oto-sclerosis, an improvement in the hearing occurred."

The author presents his results according to the technic recommended by Gray. He admits that the treament is purely empiric and quotes Gray as stating that thyroxin has probably only a local action and that there is no evidence of a deficiency of the natural hormone of the thyroid gland in otosclerosis. Any substance which produces congestion without inflammatory reaction should be a suitable therapeutic agent, but none is known other than thyroxin.

The dose is 1/64 grain (1 mg.). The manner of preparing the drug, the preparation of the ear and the technic of injection are given.

Of the 42 patients treated by the method, 54.8 per cent have shown definite improvement both in increased capacity for hearing and in reduction of tinnitus; 23.8 per cent were slightly improved temporarily, and 21.4 per cent were not materially improved. All the patients were carefully tested with bone tuning forks and audiometer before, shortly after and six months after beginning the treatments.

The subjects were selected from those in whom it was likely that improvement would result if the therapy had any virtue, but as far as could be determined they all had true otosclerosis.

LEJEUNE, New Orleans.

RECONSTRUCTION OF THE EXTERNAL EAR. R. A. MONEY, M. J. Australia **1**:819 (May 7) 1938.

A patient suffered traumatic loss of the ear except for a portion of the tragus, the incisura intertragica and the lobule. Money employed the Pierce technic and shows photograpically the sequence of a successful reconstruction. The steps include: (1) shaping and burying a piece of cartilage under the skin of the mastoid process, (2) raising a narrow Gillies tube in the supraclavicular region, (3) six weeks later transferring the tube to the neck, (4) four weeks later raising the cartilage which has on its lateral surface mastoid skin and on its medial surface temporal fascia. A large Thiersch graft was placed to cover the medial surface of the new ear and the mastoid area.

MILLER, Philadelphia.

DISCUSSION ON LATERAL SINUS THROMBOSIS. L. COLLEDGE and others, Proc. Roy. Soc. Med. **31**:897 (June) 1938.

Mr. Lionel Colledge states that while formerly thrombosis of the lateral sinus was more often a complication of chronic suppurative otitis media it is now much more common in the acute infections of the ear. He believes that the problem of treatment is one of controlling the acute septicemia rather than the pyemia, the use of prontosil being beneficial for the purpose.

Dr. D. A. Crow advocates conservative surgical procedures in the handling of such cases—that is, no ligation of the jugular vein and no removal of the clot from the infected sinus.

Mr. T. B. Layton discusses the symptomatology, particularly the chills and rise of temperature, and, briefly, some pathologic points.

Further discussion of this subject is given by Mr. Holt Diggle, Mr. F. J. Cleminson, Mr. Douglas Guthrie, Mr. H. V. Forster, Mr. E. D. D. Davis, Mr. Sydney Scott, Mr. Cowper Tompkin, Mr. Leslie Powell, Mr. Ritchie Rodger and Mr. M. Vlasto, especially in regard to conservatism or radicalism in surgical treatment, presentation of cases, points of diagnosis and statistics on incidence and mortality.

CAMPBELL, Philadelphia.

ACUTE NONSUPPURATIVE ENCEPHALITIS OF OTITIC ORIGIN. J. PIRQUET and J. MINNE, Ann. d'oto-laryng., April 1938, p. 285.

The authors reached the following conclusions: The clinical entity designated diffuse nonsuppurative encephalitis or hemorrhagic encephalitis should be more accurately termed acute cerebral edema with necrosis and occasional hemorrhage. There are several anatomic varieties of these lesions.

1. Diffuse necrosis of a large part of the cerebral hemisphere associated with more or less marked edema. The lesions are inevitably fatal.

2. Necrosis limited to a part of the cerebral mass often associated with a hemorrhagic infiltration. This type is more common and less grave.

3. Secondary infection of the necrotic focus, with formation of miliary abscesses.

4. Cerebral edema without appreciable necrosis—a benign form. Clinically this lesion gives rise to the same symptoms as cerebral abscess. Nevertheless, fever is common and localizing signs (in particular paralysis of the central facial nerve) are present a little more often than with cerebral abscess.

The pathologic picture is not well known. It is not a question of an inflammatory reaction; it is thought that occasionally one is dealing with ischemic necrosis, but more often one finds vasomotor phenomena brought about by a small embolism or arterial or venus thrombosis acting as a vascular irritant.

Treatment consists of operation on the bony focus. Incision of the dura is not advised. In the presence of dangerous hypertension trephination and decompression should be carried out.

McNALLY, Montreal, Canada.

PATHOLOGIC OBSERVATIONS ON PETROSITIS. ERNESTE PALLESTRINI, Valsalva **14**: 213 (May) 1938.

The author reports some cases in which all the symptoms of petrositis occurred and the patients died of meningitis. The temporal bones were sectioned, and the histologic observations were as follows:

Areas of spongy bone, containing marrow, were scattered throughout the temporal bones, especially in the squama, above and below the labyrinth and at the apex of the petrous pyramid. These spongy areas were invaded by osteomyelitis.

The author thinks that in every case petrositis is due to osteomyelitis of the deeper regions of the petrous pryamid.

He concludes that in every case of petrositis one should think of osteomyelitis and that therefore the surgical intervention in such cases should be much more extensive and radical than at present. Drainage is not sufficient unless every infected area can be reached. At the end he states: "Most of the so-called petrositis is osteomyelitis of the petrous pyramid, and partial or insufficient surgical intervention usually causes unpleasant complications and often results fatally."

LUONGO, Philadelphia.

OBSERVATIONS ON MIGRATION OF THE EPITHELIUM OF THE TYMPANIC MEMBRANE. A. MAGNONI, Valsalva **14**:235 (May) 1938.

The author has made his observations on a number of cases, using the technic of W. D. Stinson.

The epithelium of the tympanic membrane does not desquamate but migrates toward the external auditory canal. The author has studied the direction of this migration from every quadrant and has arrived at the conclusion that it is constant.

He has observed that even the epithelium of the external auditory canal migrates from the annulus tympanicus outward, toward the concha, and never inward; therefore, the theory that cholesteatoma is formed by the penetration of the epithelium from the external auditory canal into the middle ear through the perforations of the drum is absolutely erroneous.

LUONGO, Philadelphia.

CHANGES OF THE TEMPORAL BONE IN RICKETS AND IN "RENAL RICKETS." H. MELLER, Monatschr. f. Ohrenh. **72**:639 (July) 1938.

According to Meller "renal rickets" is an endogenous form of rickets occurring in children after the sixth year of life. It is characterized by the fact that besides skeletal changes a chronic disease of the kidneys is present. The author had an opportunity to examine the petrous bones in such a case (a girl, 10½ years old). He observed the well known changes characteristic of rickets (extensive osteoid borders), particularly in the petrous apex, in the periosteal capsule of the inner ear and in the mastoid process, while the endochondral and the endosteal capsule evidenced almost no changes. Besides this he noted signs of *Knochenumbau* (rebuilding of bone) in the wall of the internal meatus and in the periosteal capsule of the inner ear, fibrosis of the marrow spaces and many osteoclasts. The last-mentioned observations characterize the microscopic picture of "renal rickets," while in ordinary rickets only the augmented osteoid borders and the osteoid in netlike arrangements, lying in the marrow and blood vessel spaces, are significant.

LEDERER, Chicago.

LIGATION OF THE JUGULAR VEIN FOR SINAL DISEASES IN CONNECTION WITH THE MIDDLE EAR. F. X. KOCH, Monatschr. f. Ohrenh. **72**:672 (July) 1938.

The author recommends the ligation of the jugular vein not only in cases of sinus thrombosis but in cases of otogenous sepsis without a demonstrable thrombus within the sinus. Ten cases are reported in his series. LEDERER, Chicago.

HEMANGIOMA OF THE EAR. P. KEPES, Monatschr. f. Ohrenh. **72**:798 (Aug.) 1938.

The author describes a case of angioma racemosum of the concha of the ear in which he produced a cure by extirpation of the tumor. Previous ligation of vascular channels was of no avail. His surgical procedure consists of resection of the main mass, maintaining the contour of the ear and suturing the remaining portion of the helix to the periosteum over the mastoid process, which he has previously prepared. The bleeding was intense, and the technic had to proceed rather heroically. The plastic result was good, and the author believes his cure to be permanent.

LEDERER, Chicago.

BACTERIOLOGIC AND CLINICAL STUDIES OF THE COMPLICATIONS OF ACUTE OTITIS MEDIA, SURGICALLY HANDLED. EINO VAHERI, Acta oto-laryng., 1938, supp. 29, p. 1.

In an exhaustive study issued as a long supplement to the *Acta Oto-Laryngologica*, Vaheri studies cases of acute mastoiditis. His material consists of 200 cases in which material for cultures was taken by syringe directly from the exposed mastoid cells. There were 83 further cases in his series in which no organism could be obtained, and these were excluded from the study. The organism found in the cases included were as follows:

Str. haemolyticus	in	137	cases—68.5%
Str. viridans	in	1	case — 0.5%
Pneumococcus type I	in	3	cases— 1.5%
Pneumococcus type III	in	48	cases—24.0%
Pneumococcus type X (IV)	in	3	cases— 1.5%
Staph. albus	in	1	case — 0.5%
Staph. aureus	in	2	cases— 1.0%
Friedländer bacillus	in	1	case — 0.5%
Str. acidi lactici	in	1	case — 0.5%
Str. haemolyticus and pneumococcus type I	in	1	case — 0.5%
Str. haemolyticus and Staph. aureus	in	1	case — 0.5%
Str. haemolyticus and Friedländer bacillus	in	1	case — 0.5%

In no instance was the anhemolytic streptococcus encountered. Several of the colonies of streptococci which did not hemolyze blood immediately caused hemolysis on subsequent cultures. The statistics therefore indicate that in 92 per cent of all cases the mastoiditis was caused by either Streptococcus haemolyticus or Pneumococcus type III. Vaheri has compared his findings with the statistics of Wirth and Hesse, and their statistics are similar to his.

Streptococcus viridans is a rare organism in mastoiditis. Vaheri found it in only 1 case.

The staphylococcus is also relatively rare. Vaheri found it in 1.5 per cent of the cases. He found a mixed infection in the mastoidectomy wound in only 3 cases, or 1.5 per cent. Bacillus influenzae was never encountered in his material.

Clinically Vaheri divides his material into primary and secondary infections. He designates as primary infections otitis media and mastoiditis which develop without any acute concurrent condition, and 43 of the infections were primary. Of the secondary infections, 74 followed influenza, 36 an acute cold or sinal infection, 3 pneumonia, 3 sore throat, 2 peritonsillar abscess, 5 scarlet fever, 2 measles, 1 mumps, 2 an endonasal operation and 1 trauma. Of the infections due to Pneumococcus type III, 24, or 50 per cent, were secondary to influenza.

Vaheri is of the opinion that, while all the secondary otitic infections and a large part of the primary ones are exogenous, traveling up the tube, a part, at least, of the primary infections caused by Pneumococcus type X (IV) are endogenous.

The secondary otitic infections complicating influenza were caused by Str. haemolyticus in two thirds of the cases and by Pneumococcus type III in one third. In no case of influenzal otitis was the B. influenzae found.

In the otitic infections secondary to an acute cold or sinal infection, the bacteria found were about the same as in those secondary to influenza and occurred in about the same proportion.

Of the 3 infections secondary to pneumonia 1 was caused by a Streptococcus and the other 2 by Pneumococcus type III.

In 30 of the 31 otitic infections complicating sore throat, a Streptococcus was found. The remaining infection was caused by Staph. aureus. All 5 of the infections complicating scarlet fever were due to Str. haemolyticus.

The otitis due to measles in his own cases and in those in the literature reviewed by him was caused by a Streptococcus, a Staphylococcus or Pneumococcus type III in about equal proportions.

CLINICAL OBSERVATIONS

The interval between the beginning of the primary disease and the appearance of otitis appears to be shorter with the streptococcic infections than with those due to Pneumococcus type III. The majority of the streptococcic infections begin with violent symptoms, but the initial symptoms of otitis due to Pneumococus type III are much milder. Most of the otitic infections due to a Streptococcus begin with fever; those due to Pneumococcus type III begin without fever.

Most of Vaheri's patients were sent in from the provinces, and his histories indicate that otitis caused by a Streptococcus perforates the drum in an average of three and seven tenths days after the aural symptoms are first noted, while in the infections due to Pneumococcus type III the period was ten days. Complications may ensue from the otitis caused by the Pneumococcus type III after the aural discharge has ceased.

According to the clinical course he divided his material into an acute, a subacute and a latent type. Of the streptococcic infections 70.3 per cent were acute, 26.3 per cent subacute and 3.4 per cent latent. Of the infections due to Pneumococcus type III, on the contrary, 14 per cent were acute, 53.0 per cent subacute and 33 per cent latent.

External perforations were more numerous in the infections due to Pneumococcus type III. Epidural complications were also more frequent in this type

of otitis. Labyrinthitis, on the other hand, complicates the streptococcic infections more frequently than it does those due to Pneumococcus type III. The relative frequency of sinus thrombosis was about the same for both organisms. Tympanogenic meningitis is caused more frequently by the pneumococcus than by the streptococcus and appears later in the disease.

The mortality was higher in the infections due to Pneumococcus type III (10 per cent) than in those due to a Streptococcus (4.4 per cent), and in the infections due to Pneumococcus type III which have a lethal course the dangerous complications always develop late in the disease. A fatal complication may even occur after the discharge has ceased.

GROVE, Milwaukee.

Larynx

ROENTGENOGRAPHY OF THE LARYNX IN THE FRONTAL PLANE. BOUCHET and P. C. HUET, Ann. d'oto-laryng., February 1938, p. 103.

The authors point out that further information may be obtained by studying the larynx in the anteroposterior view as well as in the usual lateral views. In order to overcome the superimposition of the larynx on the spinal column they mention two alternatives. The first is tomography, which depends on an inverse movement of the x-ray tube and the x-ray film to bring one definite plane into focus. This method has not been used by the authors, but they state that they have seen it used and consider it valuable. Owing to the expense of the equipment, however, they are unable to give personal experiences.

The method which they use is to inject iodized poppyseed oil into the hypopharynx after first thoroughly cocainizing the pharynx and the larynx. For the details the reader is referred to the original article. They show a number of pictures and diagrams of intralaryngeal and extralaryngeal lesions. They consider that both methods give valuable diagnostic information.

MCNALLY, Montreal, Canada.

THYROTOMY IN HEREDITOSYPHILITIC CICATRICIAL LARYNGEAL STENOSIS. M. ESCAT, Oto-rhino-laryng. internat. **23**:5 (Jan.) 1939.

Escat reports the case of a woman aged 20 with bilateral pulmonary tuberculosis who had had dysphonia for three months and embarrassed breathing for a short time. Laryngoscopic examination revealed obstruction of the glottis by a smooth fibrous web, which united the cords and extended from the anterior commissure to the arytenoid region, leaving only a narrow slit posteriorly for breathing. A roentgenogram showed that the obstruction had a thickness of 1 cm. After preliminary tracheotomy, thyrotomy was done and the web removed with the diathermy knife. The larynx was closed at once. Healing was without incident, and three weeks after the operation the glottic opening was perfect. Histologic examination revealed lesions of endarteritis and mesarteritis in the midst of dense sclerotic tissue. No tuberculous lesion was found. All serologic reactions were negative, and no stigmas of hereditary syphilis were present.

The presence of cicatricial stenosing lesions in the larynx is the signature of syphilis, and one should not be misled by negative serologic tests and the coexistence of active pulmonary tuberculosis.

DENNIS, San Diego, Calif.

LARYNGITIS CHRONICA HYPERTROPHICA IN CHILDHOOD. H. ZISCHINSKY, Monatschr. f. Ohrenh. **72**:940 (Oct.) 1938.

The writer describes 3 cases of laryngitis chronica hypertrophica in children. This form of laryngitis is not a specific chronic inflammation in the mucous membrane of the upper part of the respiratory tract which heals by fibrosis. In 2 of his cases the disease extended to the bronchi, a situation not usually encountered in adults. The pathogenesis of the disease is not known. In 1 of the writer's

cases, measles seemed to be associated with its development. The prognosis of laryngitis chronica hypertrophica seems to be worse for children than for adults.

LEDERER, Chicago.

INDICATIONS FOR SURGICAL TREATMENT OF CARCINOMA OF LARYNX IN SYPHILITIC PATIENTS. P. REHAK, Monatschr. f. Ohrenh. **72**:1123 (Dec.) 1938.

The writer performed laryngectomy on 8 patients with syphilis. Four patients got well, and 4 died as the result of sequelae of the operation. The author draws the conclusion that in patients with syphilis the indications for laryngectomy should be interpreted with great caution. When possible, the patient should go through a thorough antisyphilitic treatment before operation in order to attenuate the strongly positive Wassermann reaction.

LEDERER, Chicago.

Nose

SPONTANEOUS CEREBROSPINAL RHINORRHEA. S. LIVINI, Brit. M. J. **1**:1208 (June 4) 1938.

Livini reports a case of cerebrospinal rhinorrhea in which there was spontaneous recovery. Up to 1934, 66 cases of cerebrospinal rhinorrhea had been reported in the literature. The condition may be associated with hydrocephalus, intracranial tumor or fracture of the skull. In other cases the cause is unknown. One theory attributes spontaneous rhinorrhea to a congenital craniopharyngeal canal, which is forced open by violent coughing or sneezing. Another explanation is that the cerebrospinal fluid tracks down the perineural sheaths of the olfactory nerves. The diagnosis can be established by examination of the fluid which escapes through the nose or by injection of fluorescein into the lumbar subarachnoid space. Cerebrospinal rhinorrhea may cease spontaneously or may require the application of a muscle graft to the olfactory groove. Local applications through the nose are useless and dangerous.

ECHOLS, New Orleans. [ARCH. NEUROL. & PSYCHIAT.]

CHRONIC MAXILLARY SINUSITIS. CARLOS LARROUDÉ, Ann. d'oto-laryng., February 1938, p. 113.

In a fifty-six page study of chronic maxillary sinusitis the author reviews the anatomy, particularly that of the maxillary ostium, in great detail. Ciliary action of the nasal mucous membrane is dealt with, and reviews of studies with colloidal thorium dioxide (thorotrast) are presented. The various methods of injecting opaque substances into the sinuses and interpretation of the results are fully gone into. Pathologic studies of the sinal mucous membrane in various types of sinusitis are presented, and the treatment is extensively dealt with.

MCNALLY, Montreal, Canada.

OPERATIONS ON THE ETHMOID SINUSES AND THE SPHENOID SINUS. TIBOR VON BAJKAY, Acta oto-laryng. **26**:639, 1938.

On the basis of operative intervention in the ethmoid sinuses in 341 cases, in 327 of which operations were done on other sinuses as well, Bajkay presents a deailed study of the indications for surgical intervention. There is nothing particularly new in this study. He lays down the indications for surgical intervention within the nose and for radical intervention as well. From a surgical standpoint chronic suppuration of the sphenoid sinus is treated either conservatively or surgically, according to the presence or absence of complications. His conservative treatment consisted of removing all obstruction to drainage or enlarging the ostium sphenoidale and irrigating the sinus. His results with frequent irrigations were relatively good. If chronic suppuration of the sphenoid sinus is associated with

a similar involvement of the ethmoid sinuses, the frontal sinus or the antrum, these must also be operated on. When conservative treatment fails he does the radical endonasal operation by Hajek's method, in which the anterior wall is completely removed and the ethmoid exenterated to the lamina papyracea. All diseased mucosa must be removed if operative bleeding is not marked; otherwise it is removed at a subsequent sitting by means of a forceps and an elevator. He warns against any curettage of the superior and lateral walls of the sinus, because of the danger of injury to the optic nerve, the carotid artery, the cavernous sinus and the dura. Unless bleeding is marked the nose is not packed after operations on the sphenoid; if packing is used, it is not allowed to remain longer than twenty-four hours. He particularly stresses the after-care and states that he uses silver nitrate on the enlarged sinal openings until a smooth scar is present.

The choice of a radical operation on the ethmoid sinuses and the sphenoid sinus depends on the symptoms or complications. Orbital and cerebral complications may occur in acute ethmoiditis or sphenoiditis or in acute exacerbation of chronic suppuration. The orbital complications consist of edema of the eyelids, periostitis, subperiosteal abscesses, orbital phlegmon, massive retrobulbar abscesses and retrobulbar neuritis. Bajkay reports 54 patients who were operated on because of retrobulbar neuritis. The sinus was diseased in 29 of these and normal in 25. Of the patients with diseased sinuses, 5 were cured, 21 improved and 3 unimproved. Of the patients with normal sinuses, 4 were cured, 15 improved and 6 unimproved.

The cerebral complications occurring in suppuration in the ethmoid sinuses and the sphenoid sinus are serous and purulent meningitis, extradural abscesses, abscesses of the brain, thrombosis of the cavernous sinus and thrombosis of the longitudinal sinus. Two patients with mucocele were operated on by the radical method because of exophthalmos and paresis of the ocular nerve, and both were cured. In 12 cases choanal polyp springing from the ethmoid sinuses was cured by intranasal exenteration of the ethmoid.

The radical operation on the ethmoid sinuses and the sphenoid sinus was employed in 2 cases of sarcoma and 5 of carcinoma of this region.

GROVE, Milwaukee.

Miscellaneous

REDUCTION OF INCREASED INTRACRANIAL PRESSURE BY CONCENTRATED SOLUTIONS OF HUMAN LYOPHILE SERUM. JOSEPH HUGHES, STUART MUDD and EDWARD A. STRECKER, Arch. Neurol. & Psychiat. **39**:1277 (June) 1938. REDUCTION OF CEREBROSPINAL FLUID PRESSURE BY CONCENTRATED LYOPHILE SERUM. DAVID WRIGHT, DOUGLAS BOND and JOSEPH HUGHES, ibid. **39**:1288 (June) 1938.

Because variations in the osmotic pressure of the blood influence the intraocular as well as the intracranial pressure, the use of concentrated lyophile serum may become important clinically for the reduction of intraocular as well as of intracranial pressure.

Hughes, Mudd and Strecker, using a preparation of four times the concentration of normal serum, report in 7 patients an increase in blood pressure and a decrease in cerebrospinal fluid pressure for relatively long periods. In 3 normal subjects they found this serum more effective than sucrose.

Wright, Bond and Hughes found that concentrated solution of serum in doses of 4 cc. per kilogram of body weight reduced the cerebrospinal fluid pressure of dogs for relatively long periods, as indicated by continuous recording of cisternal pressure. Eight cubic centimeters of serum per kilogram of body weight maintained a reduction in pressure for longer than twenty hours.

The results of the animal experiments reported in the second paper confirm the clinical observations presented in the first paper.

R. IRVINE. [ARCH. OPHTH.]

EXPERIMENTAL POLIOMYELITIS BY THE TONSILLOPHARYNGEAL ROUTE WITH SPECIAL REFERENCE TO INFLUENCE OF TONSILLECTOMY ON DEVELOPMENT OF BULBAR POLIOMYELITIS. A. B. SABIN, J. A. M. A. **111**:605 (Aug. 13) 1938.

Sabin's purpose in this communication is to present evidence (1) that the tonsillopharyngeal region is more highly sensitive to injections of poliomyelitis virus than are certain other regions of the body and (2) that the disease which results from infection by the tonsillopharyngeal route is, with few exceptions, bulbar or bulbospinal and different in its clinical course from that which follows nasal instillation of the virus. The present investigation was prompted by several clinical reports of cases of bulbar poliomyelitis following tonsillectomy and adenoidectomy within a relatively short time. It appeared desirable to investigate (1) the possibility that the presence of an open wound such as follows tonsillectomy may open a new portal of entry for the virus and (2) the ease with which poliomyelitis can be induced by injecting the virus into the tonsillopharyngeal region and whether the disease so produced is different from that which follows other modes of inoculation. The evidence presented in this communication shows conclusively that, while mere transitory contact with the normal or injured pharynx or tonsils of monkeys is not enough to produce poliomyelitis, it is possible to infect these animals when the virus in quantities of from 100 to 1,000 minimal cerebral infective doses is injected into the tonsillopharyngeal region and that this region is for some reason more sensitive than, for example, the abdominal cutaneous or subcutaneous tissue. The high incidence of the bulbar type of the disease among monkeys so treated, with the other evidence that the virus did not produce the infection by invasion along the olfactory pathway, indicates that after tonsillopharyngeal injection the virus progresses along the local peripheral nerves. The high incidence of the bulbar form of the disease in the cases of poliomyelitis following tonsillectomy in man is what one would expect, therefore, if the infection occurred by way of the throat. If the virus in the human being behaves as it does in the monkey (there is no definite evidence that such is the case), it is to be expected that for the development of post-tonsillectomy poliomyelitis the virus must be present in the secretions or in the tonsils during the operation and that intection is facilitated by any procedure involving injections or postoperative suturing. That poliomyelitis virus can occur in the secretion of the upper respiratory tract and in the tonsils of apparently healthy persons is already known; although it is not yet clear whether the virus is more prevalent during the summer and early autumn than at other times of the year, it ought to be considered whether or not the season in which the incidence of poliomyelitis is high is a favorable period for nonemergency operations about the throat and mouth.

EDITOR'S ABSTRACT. [ARCH. NEUROL & PSYCHIAT.]

CHILLING OF THE BODY SURFACES: ITS RELATIONSHIP TO AURAL AND SINUS INFECTIONS. H. MARSHALL TAYLOR and L. Y. DYRENFORTH, J. A. M. A. **111**:1744 (Nov. 5) 1938.

Taylor and Dyrenforth describe in moderate detail a number of important facts concerned with the maintenance of a normal body temperature. Any deviation from the normal for appreciable periods is apt to set up morbid changes in the economy. The human body does not possess any compensating mechanism for the maintenance of an average normal temperature in any medium colder than its normal surroundings. Cold water has a veritable appetite for heat, and since the ratio of conductivity of water to air is 27 to 1, it follows that water takes the heat from the body twenty-seven times faster than does air.

The senior author is a member of the Committee on the Otorhinologic Hygiene of Swimming of the Section on Laryngology, Otology and Rhinology of the American Medical Association and has reported several interesting observations in recent years.

The present experimental studies showed that guinea pigs in exposure tests when chilled in an ice refrigerator for one-half hour suffered a loss in leukocytes

and polymorphonuclear neutrophils. Another study consisted of observations on 8 lifeguards who swam for forty-five minutes in ocean water at a temperature of 68.5 F. After the swin, the erythrocyte count increased on the average 700,000 to 1,500,000 cells; the white blood cells increased from 3,650 to 24,750, and both the systolic and the diastolic blood pressure rose, the latter more. A third experiment was conducted, wherein 3 bathers were submerged in a pool for fifty minutes and kept reasonably quiet, refraining from any exercise. After this interval they showed a fall in temperature of several degrees, a decrease in pulse rate and relative leukopenia.

It was noted that muscular activity during exposure tended to prevent the peripheral vasoconstriction, thereby lessening the likelihood of infection. Kuntz pointed out the interrelation of the innervation of the peripheral blood vessels and that of the mucous membranes, as follows: the autonomic control of vasoconstriction and vasodilatation forms the basis of the physiologic balance between the splanchnic and the peripheral area. When stimulation by cooling results in peripheral ischemia, the mucous membranes undergo a similar experience; the prolongation of this condition serves to throw out of balance the nicety of integration existing under normal metabolic phases and accounts for the ability of ordinarily avirulent organisms to overcome the obstacles of tissue immunity at the portals of entry.

The authors conclude: It is evident from these experiments that chilling of the body surfaces without compensation leads to morbid changes within the body. They are caused by (1) peripheral vasoconstriction, with attendant peripheral stasis and anoxemia, (2) lowered leukocyte response, both total and polymorphonuclear, and (3) impairment of the phagocytic capabilities of the fixed tissue cells, including that of the nasal mucous membrane. One of the immediate results of these changes is the predisposition to infections of the upper part of the respiratory tract, the paranasal sinuses, the eustachian tubes and the middle ear.

GORDON, Philadelphia.

IRIDOCYCLITIS AND FOCAL INFECTION. H. LAGRANGE and J. GOULESQUE, Ann. d'ocul. **175**:493 (July) 1938.

In 1927 and in 1934, cases of optic neuritis in which cure followed treatment of maxillary sinusitis were reported by one of the authors. There was also reported a case of acute iridocyclitis in which the condition resisted all orthodox treatment but was at last cured after the removal of a dental cyst. The authors had an opportunity to study 3 new cases of iridocyclitis associated with sinal infection. These are reported in detail.

In the first case the patient had a positive Wassermann reaction, which brought up the question of syphilitic iritis. Sinusitis had developed which did not present any subjective or objective signs apart from low grade rhinitis. Similarly, in the second case also the Wassermann reaction was positive, and there were no evident roentgenographic signs. In the third case the causation was somewhat more obscure after syphilis, tuberculosis and rheumatism were ruled out. In all the cases the most notable feature was the rapidity with which pain ceased after treatment of the sinusitis. This is important and agrees with the course in the cases reported in the earlier articles.

It is without doubt necessary to modify the ideas with regard to iritis, which for twenty-five years has been considered as commonly caused by syphilis. Typical syphilitic iritis is a manifestation of secondary syphilis, and with the present methods of treatment secondary syphilis is seen much less frequently. An extensive bibliography accompanies the article. S. H. MCKEE. [ARCH. OPHTH.]

OTOLARYNGOLOGISTS IN THE MEDICINE OF TOMORROW. VAN SWIETEN, Oto-rhino-laryng. internat. **22**:433 (Aug.) 1938.

Hippocrates represented individuality in the philosophy of medicine; Galen represented social or collective medicine. In modern times collective medicine,

including nursing and hygiene, derives from the discoveries of Pasteur. In order to combat social ills, hygiene must be supported by the public powers and by subsidized private groups. Aid, formerly called charity, is to become social service, and the state will gradually take over the controls. Social medicine is today inscribed on the program of governments. Preventive medicine, insurance and prenuptial examinations are to be seated, not yet on the knees, but in the gilded arm chair, of traditional medicine. The patient and the doctor himself will collaborate in this centralization. From birth to the end of life man will be protected from and guaranteed against disease and misery. The place of the otolaryngologist will be in the systematic examination of infants and school children, to ferret out latent otitides, pathologic tonsils and adenoids and other potent predisposing factors in future ills, and in prenuptial, industrial and insurance examinations. This will be largely through the medium of group practice. But the burning question of nonindigent patients in hospitals must be resolved, taking into account the just claims of personal medicine and establishing connection between it and collective medicine. Otolaryngology must be introduced everywhere the activities of preventive medicine are manifested.

Let it be known how to unite the right of the individual and those of society. Let Hygiene not be asked to give one a soul nor the belief be held that the happiness of humanity is a question of the stomach.

DENNIS, San Diego, Calif.

STUDY OF THE SO-CALLED NASAL COUGH. J. TARNEAUD, Rev. de laryng. **59**:386 (April) 1938.

Cough may be due to toxic stimulation of the ends of the vagus nerve in the pharyngeal plexus caused by rhinitis or to hyperesthesia of the nerve, resulting from asthma, pressure or hyperthyroid disorder. In those patients who cough on irritation of the nasal mucosa, the author has been able to suppress the cough reflex by cocainization of the lateral pharyngeal wall. This he believes is sufficient evidence to warrant the dropping of the term "nasal cough."

BATSON, Philadelphia.

A CLINICAL STUDY OF VESTIBULAR DISHARMONY. A. CHARBONNEL, Rev. d'oto-neuro-opht. **16**:513 (Oct.) 1938.

The characteristic of the harmonious vestibular syndrome is that all the *slow* reactional movements have the same direction, i. e., the slow component of nystagmus, deviation of the body and deviation of the extended arms. Semeiologically a harmonious vestibular syndrome signifies a peripheral lesion of the side toward which the movements are directed. While it may be observed in cases of disturbance of the central pathways of equilibrium, it constitutes only one of several combinations that may be revealed in such cases. A different direction of two or more of the slow reactional movements (as, for example, when the slow movement of nystagmus has a direction opposite to that of the deviation of the extended arms or of falling in the Romberg test) was called by Barré a disharmonious vestibular syndrome. Not all observers are in agreemnet as to the semeiologic significance of the disharmonious syndrome. Basing his conclusion on careful clinical observations, Barré regarded it as a sign of involvement of the cerebellum, since in all cases in which he observed it cerebellar lesions were discovered at operation or at autopsy. The elements of the syndrome are due to involvement of the vestibular tracts, but it was necessary to assume a cerebellar disturbance to explain their grouping. Ramadier and Caussé stated the belief that the disharmony is solely due to central disturbance of the vestibular pathways. Actually, the divergence of these views is minimal, since all the investigators stated the belief that only an alteration of the central vestibular tracts could produce the phenomenon. In a study of 20 cases, published in 1935, Charbonnel expressed opinions favorable to the theory of Barré.

The results of the study of 5 additional cases are given in the present article: 1 case of cerebellar tumor, 3 of multiple sclerosis and 1 of infectious process in the posterior fossa. Characteristic of all the cases was the importance of symptoms of central origin: rotatory nystagmus, constancy of the character of the vestibular manifestations, inability to transform the provoked horizontal into rotary nystagmus by inclining the head to the side or to invert its direction by putting the head downward, feeble vertigo occurring both spontaneously and after testing and unequal distinctness of the various elements of the syndrome. The possible combinations of the elements of vestibular disharmony are multiple. Whatever its form, it indicates abnormality in the central part of the vestibular tract, whether the disharmony occurs spontaneously or after instrumental labyrinthine tests. A quantitative difference in the reactions to the tests has not the same value, provided there is harmony between the reactions obtained. Caloric areflexia with normal galvanic or rotatory excitability is not disharmony, for, although such dissociation may occur in cases of lesion of the fourth ventricle, it occurs likewise with peripheral lesions, such as syphilitic neuritis of the eighth nerve or tumor of the acoustic nerve in its early stages, while no bulbopontile compression exists. Vestibular disharmony practically never occurs with peripheral lesions. Disharmony of the vestibular reactions arising during the course of otitis indicates the possibility of complication in the central nervous system (abscess, otitic hydrocephalus or posterior collateral meningoencephalitis) and requires further investigation (lumbar puncture). The semeiologic value of vestibular disharmony is equal to that of other precise vestibular syndromes, such as incomplete and parcellary syndromes, crossed vestibular disreflexia and "retournement" of nystagmus (Neumann). While an alteration of the central vestibular tracts alone gives rise to vestibular disharmony, it has also proved true in Charbonnel's experience that the syndrome is always associated with a disturbance of the cerebellar apparatus, usually of the vermis. The chief value of the sign of disharmony is that it permits differentiation between a central and a peripheral lesion and that it is found only with disturbances in the posterior fossa, tumor of the cerebellum, the fourth ventricle or the cerebellar-pontile angle, abscess, infectious processes involving the neuraxis and hemisoftening of the bulb from a thrombus of the posterior-inferior cerebellar artery (quick component of nystagmus and Romberg's sign toward the side of the lesion). With thrombosis of the artery of the lateral fossa the quick component of nystagmus is contralateral. André-Thomas has observed several cases of syringobulbia in which nystagmus and Romberg's sign had the same direction. Vestibular disharmony following cranial traumatism speaks in favor of lesions of the central nervous system. The sign of vestibular disharmony has been useful in (1) localizing a tumor of the brain when its seat was unknown owing to lack of other neurologic signs than intracranial hypertension, (2) determining the location of a tumor in the posterior fossa masking as a frontal tumor, (3) arousing suspicion, at times early, of cerebral complication of otitis, (4) delimiting more exactly the extent of the lesions of an infectious process of the neuraxis and (5) forecasting important sequelae of cranial traumatism. A neurologic examination is not complete unless the vestibular apparatus is explored.

DENNIS, San Diego, Calif.

TREATMENT OF CAUSTIC (LYE) POISONING IN THE CHILDREN'S CLINIC OF THE UNIVERSITY OF BUDAPEST. EDUARD GYORGY, Pract. oto-rhino-laryng. **1**:203 (July) 1938.

The author has shown that the many laws prohibiting the indiscriminate sale of lye and other caustics have markedly decreased the number of patients with caustic poisoning admitted to this station. In 1923 122 patients were admitted; in 1936, only 19.

The method of treatment is bougienage beginning five to six days after the poisoning. The author uses a soft rubber sound, the gage of which varies with the age of the patient: under 1 year, no. 28; between 1 and 3 years, no. 29, and

over 3 years, no. 30 or 31. The sound is warmed in hot water and lubricated with liquid petrolatum before insertion. After its induction, the gag is removed and a small rubber stopper slipped over the sound. This rests between the teeth. For the first six weeks the sound is permitted to remain in place for fifteen minutes. After eight weeks it remains only five minutes. If the patient responds to this treatment, a semisoft sound with a conical end (Rusch) is substituted. If fever or evidences of bleeding occur, the bougienage is continued with a sound of smaller caliber. If difficulties are encountered in the use of the sound or the patient is seen several weeks after the poisoning, then a fine probe must be used. This procedure is perhaps best done by esophagoscopy, by means of which one can definitely determine the degree and position of the stricture. After the probe has been passed, the dilation can be continued by a suitable sound. If the stricture is so marked that the child can swallow only water and the sounding is practically impossible, gastrostomy is indicated, which in a few weeks should be followed by retrograde bougienage.

The author further stresses the fact that the success of treatment depends on its continuance over a long period.

PERSKY, Philadelphia.

USE OF BISMUTH IN THE TREATMENT OF SOME NONSYPHILITIC CONDITIONS IN OTOLARYNGOLOGIC PRACTICE. ESPEDITO DILAURO, Valsalva **14**:294 (June) 1938.

The author claims that bismuth has a great affinity for nerve fibers, on which it has a definite sedative effect. He has used bismuth successfully in the treatment of pains about the temporal region and of persistent headache after mastoidectomy. He maintains that he has produced definite and permanent relief from trigeminal neuralgia, vacuum headache and finally all pains and aches about the head without any definite cause.

He reports great series of cases in which nonsyphilitic conditions were treated with bismuth. He administers bismuth hypodermically in the same dose used in the treatment of syphilis and he asserts that he has had results after the fifth or the sixth injection.

He concludes that bismuth has a definite beneficial action on peripheral pains.

LUONGO, Philadelphia.

METHOD OF ANALYZING CEREBROSPINAL FLUID IN OTOLOGIC CASES. HARRY BJÖRK, Acta oto-laryng. **26**:521, 1938.

Comprehensive examination of the cerebrospinal fluid in an otologic case should include only those tests of value to the otologist and exclude those which are of value only to a neurologist and should have particular reference to intracranial complications of otitic origin. Of special importance in this field are the fractional examination of the fluid and the Tobey-Ayer test. The examination of the cerebrospinal fluid carried out at the University Ear Clinic at Helsingfors included (1) measurement of pressure, (2) estimation of albumin, (3) cell count, (4) determination of sugar, (5) determination of the chlorides, (6) a Wassermann and a Kahn test and (7) bacteriologic examination. Björk's conclusions are drawn from 140 analyses on 97 patients at Helsingfors, together with 385 analyses on 190 patients in the clinic of Gadolin at Wiborg.

The clinical value of measurement of pressure lies in the fact that increased pressure (about 300 mm. of water or even more) occurs only when the suppuration has reached the dura or broken through it, as in epidural abscess, sinus thrombosis, meningitis and abscess of the brain. The actual measurement of the pressure has the advantage that it can be carried out at the same time as the Tobey-Ayer test.

For the determination of albumin the older Pandy and Nonne tests were used. In 385 examinations of fluid the reaction was positive in only 1 case in which no epidural, intradural or transdural suppuration was present.

The cell count is the most important part of the examination. The absolute cell count varies considerably during the course of meningitis. It must be noted that a considerable reduction in the count does not indicate an improvement in the condition if it is not associated with an improvement in the clinical picture. The differential count is of importance in that a relative increase in polymorphonuclear cells indicates a progression, while relative lymphocytosis indicates a remission, of the disease. The cell count is of much greater significance if made by the fractional method of Westergaard, in which the fluid is withdrawn in several tubes. A higher count in the last tube than in preceding tubes indicates a progression in the meningitis and a poor prognosis, whereas the same or a lower count in the last tube denotes that the patient is holding his own or improving. Not more than 10 cc. need be withdrawn for this test, to be divided into three portions.

The determination of sugar, which Kopetzky recommended in 1913, is of value only when a well developed meningitic process is already established. He pointed out that a reduction in the sugar content takes place before bacteria have actually invaded the fluid. Björk's findings are in agreement with this. He finds the test of value from a prognostic standpoint if the cerebrospinal fluid is already markedly pathologic. If the sugar content is normal at this time the prognosis is less unfavorable than if it is reduced.

The determination of the chlorides appears to play no role in the diagnosis of otitis. In the bacteriologic examination of the fluid both smears and cultures are used. For cultures semifluid agar is recommended in order to catch the pneumococcus, which does not ordinarily grow well on aerobic culture material.

GROVE, Milwaukee.

Society Transactions

MONTREAL MEDICO-CHIRURGICAL SOCIETY, SECTION OF OTO-LARYNGOLOGY

G. E. Hodge, M.D., *President*

Monthly Meeting, Feb. 8, 1939

E. A. Stuart, M.D., *Abstract Editor*

Pulmonary Abscess Following Tonsillectomy. Presented by Dr. L. J. Baker.

A girl aged 6 years had her tonsils and adenoids removed on June 17, under open ether anesthesia. The postoperative course to recovery was uneventful. On June 25 she was apparently healthy, and the tonsillar fossae were healing. On July 14 she was referred to the hospital with the following symptoms (1) fever of one week's duration, the temperature ranging from 100 to 102 F.; (2) explosive coughing; (3) foul-smelling greenish sputum, and (4) loss of weight and loss of appetite. Dulness and faint breath sounds were noted in the apex of the right lung, extending to the third rib. The clinical impression was abscess of the upper lobe of the right lung. Roentgenograms showed a shadow about 5 cm. in diameter, with a fluid level. Postural drainage was begun.

After four days about 3 cm. of the right third rib was removed. Only slight adhesions between the parietal and the visceral pleura were noted. The wound was packed with gauze.

For a week the temperature ranged from 100 to 104 F. The child was drowsy and listless and had a constant dry, hacking cough. On July 25, with the patient under light ether anesthesia, all packing was removed and a small amount of yellow pus aspirated. The wall of the abscess was incised and the cavity packed with iodoform gauze. The lung tissue encountered was necrotic.

The following day the temperature was 105 F. During the week it ranged from 99 to 104 F. It fell by lysis. On July 30 a roentgenogram showed the cavity to be about 1.5 cm. in diameter. The patient was discharged on August 14 with a diagnosis of dulness, rales and signs of thickened pleura at the apex of the right lung. She was subjectively well. For six weeks a course of treatment with cold vaccine was given. The temperature was between 99 and 100 F.

At home progress was uneventful except for acute bronchitis in November. The temperature subsided in twenty-four hours. On November 28 a roentgenogram showed both pulmonary fields clear, with the abscess healed. The results of special examinations were as follows: Culture of the sputum showed Streptococcus viridans. The urine showed a trace of albumin but no pus or blood cells. The blood count on July 14 was 4,000,000 erythrocytes, with 90 per cent hemoglobin, and 13,000 luekocytes, with 20 per cent lymphocytes and 9 per cent monocytes.

DISCUSSION

Dr. J. B. Ross: Dr. Baker's case seems to be a classic case of postoperative pulmonary abscess, and, from the films shown, seems to have followed the usual course of pulmonary abscesses that do well, as three or four months were required for complete healing. Recent publications in the *American Review of Tuberculosis* show that the duration of the average favorable course is about four months. In estimating the probable gravity of pulmonary abscess it is important to separate

abscesses resulting from the aspiration of infected material through the trachea from those resulting from the lodging of infected emboli in the lung. The latter, usually multiple, often bilateral and associated with infection of the blood stream, have a much higher mortality than the former. There seems to be a definite tendency also to try to distinguish between pulmonary gangrene and pulmonary abscess. Pulmonary abscess is a suppurative condition; pulmonary gangrene is putrid necrosis of the lung. The sputum gives a great deal of information in establishing this distinction, and the more purulent the sputum is, the more likely is the condition to be an uncomplicated abscess and the more favorable the outcome is likely to be. It appears from the synopsis and roentgenograms that Dr. Baker's case is one of abscess due to aspiration, but certainly from the findings in the sputum and at operation one would suspect a certain amount of associated gangrene of the lung.

Another point in Dr. Baker's case was the early surgical treatment of the abscess. Bronchoscopic procedure was not mentioned, but this abscess of the upper lobe of the lung would have been difficult to reach by a bronchoscope. Most operators seem to be tending to advocate earlier surgical intervention than previously. Medical treatment, posturing, the use of the bronchoscope and other measures should be tried, but such treatments should never exceed two months if the course is unfavorable. For patients who do not seem to be responding to medical treatment, surgical drainage should be instituted early rather than late, when the abscess is associated with scarring. Use of phrenicectomy and pneumothorax is almost given up as an unsuccesful treatment.

Prof. E. G. D. Murray: Str. viridans is the name of a group of organisms found in sputum, and it is perhaps doubtful whether the presence of any member of that group would account for what is described in the synopsis. The necrotic lung tissue and the pus were seemingly not examined, and whether the pus had an unpleasant smell is not stated. It is possible that such a condition as this is associated with anaerobic organisms rather than with the spirochetes and pneumococci that were looked for. More than one kind of anaerobic streptococcus or bacteroid is common in the mouth and the upper respiratory tract, and the organisms are capable of causing disease. Their recognition depends on special methods, and they are usually neglected. It might be well to remember them when conditions of this kind are investigated.

Dr. D. H. Ballon: With few exceptions patients suffering from pulmonary abscess should receive a diagnostic bronchoscopic examination, which will exclude the presence of a foreign body and demonstrate the presence or absence of bronchial stenosis. It will endeavor to follow the pus stream to its source and so localize the abscess. When a pulmonary abscess has ruptured into a bronchus, the earlier bronchoscopic drainage is established, the better it is for the patient. The bronchoscopic treatment enables one to remove granulations, dilate strictures and aspirate secretions which the patient is unable to get rid of by postural drainage. It might help to prevent the spread of the lesion, not only on the affected side but occasionally to the opposite lung. In proper hands the results obtained from bronchoscopic aspirations outweigh the ill effects and the slight discomfort to the patient.

Dr. R. R. Fitzgerald: The surgeon should see such patients early in case an operation should be necessary.

Parapharyngeal Abscess Following Dental Infection. Presented by Dr. J. W. Gerrie.

Blocking of the inferior dental nerve by the injection of an anesthetic is an almost universal means of anesthetizing the lower teeth. The needle is carried about 3 cm. to the inferior dental nerve, between the internal pterygoid muscle and the ramus of the mandible. About 2 cc. of the anesthetic is injected.

A retropterygoid abscess sometimes develops between the internal pterygoid muscle and the mandibular ramus. Trismus is the first sign of infection. As the abscess enlarges, it passes into the parapharyngeal or the pharyngomaxillary space and becomes a parapharyngeal abscess. This causes prolapse of the lateral pharyngeal wall, the second sign of infection. The whole wall appears pushed toward the midline. The infection is deep. The mucosa is pink, not fiery red. From the parapharyngeal space the abscess reaches the parotid, forming a parotid abscess and the submaxillary fossa, forming a submaxillary abscess.

Mosher, Beck, Barnhill and Ford, feeling that thrombosis of the jugular vein is imminent, advised early evacuation of the abscess through an incision below the body of the mandible, before the infection reaches the submaxillary and the parotid region. Figi and Havens, of the Mayo School, stated that thrombosis of the great vessels is not imminent and that the abscess will work to the surface in the submaxillary area. They incise the abscess when fluctuation is evident. Goodyear and Boemer advocated early incision of the abscess through the mouth, in front of the anterior or behind the posterior pillars of the tonsil.

In 2 cases, an opening was made through the submaxillary area when fluctuation appeared.

DISCUSSION

DR. R. R. FITZGERALD: In considering the prevention of parapharyngeal abscess one should emphasize the danger of using local anesthesia in the presence of acute, spreading suppuration. Our dental colleagues, aware of this danger, insist on general anesthesia when operative work is necessary in the presence of acute sepsis. Interest in parapharyngeal abscess is centered around the recommendation of Mosher and others that it is better to operate early, within the first forty-eight or seventy-two hours, than to wait for abscesses to form in the face and neck and open them one by one until the lesion subsides. The former procedure saves time, disfigurement and prolonged toxicity. If the diagnosis is assured, I am in favor of early operation, with incision of the skin below and behind the angle of the mandible, followed by dissection behind the stylomandibular ligament and opening of the parapharyngeal space. I am not in favor of establishing drainage by incision inside the mouth. I have found secondary arterial hemorrhage to be the great hazard. The literature on the subject emphasizes the danger of thrombosis of the internal jugular vein, but I consider secondary arterial hemorrhage to be the much more serious and frequent sequel. Dr. A. B. LeMesurier of Toronto reported 5 cases of deep cervical suppuration with secondary arterial hemorrhage. Two patients died of hemorrhage, and no postmortem examination was made. In a third autopsy revealed a large opening in the internal carotid artery. Dr. LeMesurier has operated on 2 patients during arterial hemorrhage which resulted from suppuration in the parapharyngeal space. They were saved by first ligaturing the common carotid artery.

A child 3 years of age at the Children's Memorial Hospital became exsanguinated by hemorrhage into the mouth following a parapharyngeal abscess. Nine days previous to the hemorrhage the abscess had been incised inside the mouth. A small hemorrhage from the mouth occurred daily after the operation. On the ninth day the common carotid artery was ligatured, with immediate relief.

DR. R. E. MCMAHON: An antiseptic is always applied before injecting the anesthetic. The injection is made well away from the region of the affected tooth. By injecting upward from the second or third molar to a depth of ¾ inch. (2 cm.), one anesthetizes the whole of the mandible on the same side and provides anesthesia whereby the dentist may work on any of the teeth as far as the midjaw. Local anesthesia is used extensively in the clinic with which I am associated, where between eighteen and twenty thousand teeth are removed each year. Pharyngeal abscesses and other infections are at a minimum. In teaching the technic to

students with what apparatus we have at our command my associates and I have met little in the way of complications. To guard against pharyngeal abscess, we emphasize that one should never make an injection in the presence of an acute inflammatory condition. A platinum needle is used for the injection.

Dr. J. W. Gerrie: Parapharyngeal abscess has had a prominent part in the otolaryngologic literature of the past ten years, but in the cases reported it has been of pharyngeal or tonsillar origin. For that reason the 2 cases have been presented. The abscess starts in the pharyngeal space, about the inferior dental nerve. Then it passes back into the parapharyngeal space. In the 2 cases no acute infection was present. One patient had a chronic dentoalveolar abscess of a lower second molar, and the other had chronic periodontal disease of the same tooth. In each case the injection was through a clean area far removed from the chronically infected dental tissue.

Prof. E. G. D. Murray: There is no need to suppose active infection can be due only to a partially sterilized needle, though complete sterilization should be unquestionable. A variety of infective organisms may be available on the mucous membranes, and to avoid accidents on this account there is usually some attempt to prepare the operative site by the use of disinfectants. Apart from the choice of disinfectant, time is usually neglected in preparation of the site. It must be recognized that it requires time for any disinfectant whatsoever to be effective. No disinfectant which can be applied to the tissues safely can effect instantaneous sterilization.

Bacteriologic Review of the Cases of Suppurative Otitis Media and Mastoiditis Observed in the Royal Victoria and the Montreal General Hospital During 1938. Presented by Dr. E. E. Scharfe.

CASES OF ACUTE SUPPURATIVE OTITIS MEDIA IN WHICH RECOVERY OCCURRED WITHOUT MASTOIDECTOMY

Organism	No. of Cases
Streptococcus haemolyticus	30
Staphylococcus pyogenes	22
Pneumococcus type I	5
Pneumococcus type II	1
Pneumococcus type III	2
Pneumococcus type IV	1
Pneumococcus type V	1
Pathogenic diphtheroids	1
Haemophilus influenzae	2
Streptococcus anhaemolyticus	3
Bacillus pyocyaneus	1

CASES IN WHICH SIMPLE MASTOIDECTOMY WAS REQUIRED

Organism	No. of Cases
Streptococcus haemolyticus	69
Staphylococcus pyogenes	13
Pneumococcus type I	1
Pneumococcus type III	23
Pneumococcus type IV	1
Haemophilus influenzae	1
Streptococcus anhaemolyticus	2
Bacillus proteus	1
Bacillus pyocyaneus	1

There were also 26 cases in which culture showed no growth. In 14 of these simple mastoidectomy was performed.

COMPLICATIONS

Complication	Organism	No. of Cases	Comment
Subperiosteal abscess	Str. haemolyticus	4	
	Staph. pyogenes	1	
Retropharyngeal abscess	Pneumococcus type III	1	
Extradural abscess and labyrinthitis	Pneumococcus type I	1	
Paralysis of facial nerve	Pneumococcus type IV	1	Recovery followed operation
Thrombosis of lateral sinus	Pneumococcus type III	1	
	Str. haemolyticus	1	
Thrombosis of lateral sinus and osteomyelitis of petrous tip	Pneumococcus type III	1	Patient died
Thrombosis of lateral sinus and septicemia	Pneumococcus type III	1	Patient died
Meningitis	Str. haemolyticus	3	2 patients, whose spinal fluid contained no organisms, recovered
	Pneumococcus type III	4	All patients died
Pneumonia (type III)	Pneumococcus type III	1	
Cardiac decompensation	Staph. pyogenes	1	Patient died

DEATHS

Condition	Organism	No. of Cases	Comment
Thrombosis of lateral sinus and septicemia	Pneumococcus type III	1	
Thrombosis of lateral sinus and osteomyelitis of petrous tip	Pneumococcus type III	1	
Meningitis	Pneumococcus type III	4	Patients had meningitis on admission
	Str. haemolyticus	1	Acute exacerbation of chronic otitis media occurred
Cardiac decompensation	Staph. pyogenes	1	

There were 4 deaths at each hospital.

Six of the 8 deaths were due to infection with Pneumococcus type III.

AGE

Of the patients infected with Streptococcus haemolyticus, 94.8 per cent were below the age of 50; of those infected with Pneumococcus type III, 50 per cent were over the age of 50. In patients below the age of 50, 52.2 per cent of infections were due to Str. haemolyticus; in those above the age of 50, 55.5 per cent were due to Pneumococcus type III.

DICUSSION

PROF. E. G. D. MURRAY: This is an important compilation. Its value lies principally in the demonstration that the bacteriologic work summarized is not as effective as it should be, and, as I understand it, there are several contributory causes which should be considered before discussing the significance of individual findings.

The first source of error, and one which it is not possible to exaggerate, is in the collection of specimens. It is essential to submit the best obtainable specimen, and as adequate a sample as can be, to the laboratory as quickly as possible after collection. It is true that swabs cannot be entirely eliminated, but they should be avoided whenever possible, and in operations it is usually feasible to collect portions of diseased tissue. More care in the collection and delivery of specimens means not only that material from the site of disease processes would be examined but that the chances of survival and detection of significant micro-organisms would be improved.

The second important source of error is lack of close cooperation between the ward and the laboratory. I believe it is important to inform the laboratory staff of the clinical diagnosis, any peculiarity observed, such as odor, necrosis

or membrane, and the source and time of collection of the specimen. This would help to guide them in determining the type of examination to be made and indicate that particular attention should be paid to anaerobic methods or other procedures. Usually the laboratory staff lack this information and therefore neglect special methods and may well miss important results.

Remaining sources of error are strictly technical, and some can be corrected more easily than others. The laboratory staff would be stimulated to greater effort by evidence of interest in their results and the communication of significant information concerning the cases. It is hard to be interested in a specimen labeled "throat swab" or "swab from ear." Mutual encouragement would promote better work.

More attention to the points I have mentioned would probably result in the isolation of organisms not mentioned in this list and a more exact identification of others. It would be reasonable, too, to expect a much smaller proportion of cases in which "culture showed no growth." I believe that the value of methods of treatment can be determined only when one has the correct diagnosis, which involves the exact recognition of the organisms involved.

Looking at the figures presented I am uncertain of their value, but I am impressed by their evident imperfections from a strictly bacteriologic point of view. It is worth while considering certain of the organisms enumerated: Str. haemolyticus might mean any one of the ten species, some of which do not belong to the pyogenes group and most of which are found in the upper respiratory tract of man. Their exact identification is still one of the difficult but important tasks in bacteriology and should be aimed at. Staphylococcic infections require more careful investigation than they have had. These organisms are sufficiently common in the mouth, throat and nose to make it desirable to study films directly from the lesion to determine their abundance and relation to phagocytes, as is seldom possible with blood saturated on dried up swabs. I see little or no value in the names "albus" and "aureus," since the two forms can be derived one from the other and I regard them as varieties of Staph. pyogenes. It is important to distinguish Staphylococcus epidermidis, which seems not to be pathogenic and which is confused with the white variety of Staph. pyogenes. The pneumococcus presents no difficulty in identification and typing. Considering the number and variety of types isolated from the upper respiratory tract in cases other than those of pneumonia in my laboratory during the past year, I am surprised at the limited number of types and the paucity of cases listed here. H. influenzae also is surprisingly infrequent, perhaps because the specimen was dried up or otherwise unsuitable. It is so common in disease of the upper respiratory tract that I should expect it to appear more frequently in a summary such as this and especially in reports on children. The absence of strictly anaerobic organisms from the list probably means they have not been looked for, most likely because the specimens were not adequate to do more than make the ordinary aerobic culture. Anaerobic culture is more difficult and tends to be neglected unless there is good indication that it is necessary. I think more of it would be done if more interest were shown in the results, better specimens were collected and some information about the case were available.

CEREBELLAR ABSCESS. Presented by DR. J. K. M. DICKIE.

A boy aged 10 years was admitted to the Ottawa Civic Hospital on Nov. 30, 1938, with a history of otitis media in the right ear of one month's duration, severe headache and recent dulness at school. On examination the right ear drum was seen to be scarred but not red. The left ear drum was slightly congested. The temperature was slightly raised on admission. On December 12, the patient complained of frontal headache. He was quiet in bed. He was drowsy and had fallen asleep once or twice at a meal. He had paralysis of the left external rectus muscle, of eight years' duration. He had spontaneous nystagmus to the right and vomited frequently. His hearing was good. The leukocyte count was 20.000.

There was no pointing deviation with either hand. He had distinct adiadokokinesis on the right side. A cold injection with a syringe in the right ear for three minutes suppressed the spontaneous nystagmus. The patient stood with difficulty and tended to fall to the left. There was no loss of power. Knee jerks were absent. There was plantar flexion but no clonus. The abdominal reflexes were normal. There was no nuchal stiffness and no Kernig sign. The eyegrounds and visual fields were normal. There was no aphasia. The spinal fluid pressure was 8 mm. of mercury. There were 4 cells per cubic millimeter. Fehling solution was reduced by the cerebrospinal fluid. The temperature and pulse rate were normal. Diagnosis of a cerebellar abscess on the right was made.

On December 13 the right mastoid was opened. It was sclerotic. There was clear yellowish mucus in and about the antrum. A large area of dura was exposed behind and in front of the sinus. The dura was tense. It was incised, and the cerebellum was explored with a needle. About 2 drachms (7.8 Gm.) of pus and yellowish fluid escaped. The cavity was packed with rubber tissue. On December 14 the patient was conscious and free from headache. He still had nystagmus. Cultures of Streptococcus nonhaemolyticus were obtained. On December 18 he was bright mentally; he was vomiting, had headache and was drowsy. The leukocyte count was 16,000. The dura was tense. The possibility of a second abscess was considered. The wound was reopened. A wider removal of bone was made. The slit in the dura was slightly open, and the brain had herniated. Thin pus came from the opening in the brain. The lateral sinus seemed to be compressing the brain in front. It was clamped and divided. While the sinus was being tied, pus squirted 4 inches (10 cm.), and 1 ounce (30 cc.) was evacuated. The abscesses did not appear to communicate. On December 20 the patient was clear mentally. There was no vomiting for twenty-four hours. However, vomiting recurred. On Jan. 3, 1939, he was becoming emaciated. The vomiting persisted. There was no increase in the cerebrospinal fluid pressure. The leukocyte count was 20,000, and the temperature was elevated. On January 8 retraction of the head developed, and the patient became semicomatose and incontinent and died. At autopsy the cerebral hemispheres were seen to be a little edematous. The pons and the anterior surface of the cerebellum and medulla were covered with thick pus. Pus reached the base of the brain by leaking along the surface of the cerebellum. No further abscesses were found.

DICUSSION

DR. A. R. ELVIDGE: The case is interesting to me because it represents what one finds on the borderline between otolaryngologic and neurosurgical practice. Such conditions often are most difficult to treat and difficult to diagnose. The greatest difficulty is one of diagnosis rather than of treatment. Of late years there seem to have been fewer intracranial complications from conditions of the nose and throat, and I take it that otolaryngologic treatment must be changing, becoming either a little more or a little less radical.

Cerebral abscesses are not common, certainly not here. They are difficult to diagnose and difficult to treat, and the mortality is generally considered high. There are many reasons for that, which have to do with the special anatomic and physiologic relations of that region. First of all, one has to consider the question of diagnosis. Sometimes one has the impression that an abscess is present, but because there are no definite focal signs and the patient is rather bright and alert the diagnosis cannot be made. Perhaps a localized subarachnoid or a subdural effusion is present or extensive venous thrombosis, which may cause some syndrome. When the abscess lies immediately beneath the dura, as in the present case, wherein the abscess lay a short distance beneath the surface of the cerebellum, treatment through the mastoid is probably the method of choice. If one decides on it, however, there is to be considered the obvious risk of perforating the dura directly beneath the infected field and infecting the meninges. In certain cases one may be prepared to take that risk. Another method may be suggested:

If no involvement of the dura is found which would indicate a direct extension with an immediately adjacent lesion, it is probably wiser to make a separate craniotomy opening to drain the abscess farther back through a clean field. Many complications can occur. One must attempt to seal off or protect the subarachnoid spaces, which are deep, especially in this region, and one must be prepared to deal with the complications of intracranial pressure and try to keep the pressure low during the period of convalescence. Cerebral or cerebellar edema is always present and may be difficult to control. There is always the risk of compression of the brain stem. In the case under discussion it looked for a time as though the patient would recover. There are probably many reasons for failure. Sometimes abscesses are multiple, as the abscess in this case seemed to be. This adds to the difficulty of diagnosis. There is the question of differential diagnosis, which I will not take time to discuss. There have been a number of interesting papers concerning "otitic hydrocephalus" in *Brain* during the last year, which will answer the question to some extent. "Otitic hydrocephalus" may be associated with thrombosis of the lateral sinuses, which may spread to the medial longitudinal veins and the cerebral veins. None of the authors seem to mention subdural effusion, which often goes along with this condition. The terminology seems frequently to be confused.

Dr. A. O. Freedman: The abscess presented unusual and misleading features from a diagnostic point of view. It is rather peculiar that although there was spontaneous nystagmus to the right, there was no spontaneous past pointing with either hand. An unorthodox finding with a right-sided cerebellar lesion was the patient's tendency to fall to the left. The absence of choked disks is unusual with a large cerebellar abscess. The prognosis of cerebellar abscess is poor. In 1922 Fremel, of the Neumann clinic in Vienna, investigated 100 cases of cerebellar abscess. Serial sections of cerebellums showed a large number of abscesses, some of them microscopic, to be multiple. He stated the belief that the organisms travel along the arbor vitae by lymph channels. In 1922 the Neumann clinic and Alexander's clinic, in Vienna, considered the mortality 100 per cent. Neurosurgeons now claim a 30 per cent rate of recovery.

Dr. J. K. M. Dickie: Abscess of the brain is not as common as it used to be. Such abscesses used to be found in the wards all the time, but now one appears once in two or three years. Abscess of the brain is more common in chronic otitis media.

Meningitis Following Mastoiditis, with Recovery. Presented by Dr. Keith Hutchison.

A boy aged 13 was admitted to the hospital on Nov. 14, 1937, with a history of cold and headache for two weeks. The left ear drum had ruptured ten days previously. For five days he had had severe bitemporal headache, chills, high temperature, nausea and vomiting. There was a large perforation in the left ear drum, with profuse discharge. There was slight tenderness over the tip of the left mastoid. The right ear drum was scarred. He had slight stiffness of the neck. On November 15, simple mastoidectomy was performed on the left ear. A small amount of seropus was present at the tip of the mastoid, close to the lateral sinus. The dura of the middle fossa appeared healthy. The lateral sinus was exposed but not opened. On November 16, the temperature was elevated. The patient was nauseated. Prontosil (the disodium salt of 4-sulfamidophenyl-2′-azo-7′-acetylamino-1′-hydroxynaphthalene-3′, 6′-disulfonic acid, the substance previously known as prontosil soluble and now called neoprontosil) was given every four hours. On November 17 its administration was temporarily discontinued because of a cutaneous reaction. Five hundred cubic centimeters of blood was given intravenously. On November 18 the wound was clean. The patient was less irritable and not irrational. The temperature remained high. Nausea with vomiting occurred. Fluids were given intravenously. The cerebrospinal fluid and the mastoid yielded a culture of Streptococcus haemolyticus. On November 19 the

patient had acute toxic delirium, stiffness of the neck and bilateral positive Kernig signs. The abdominal reflex was weak on the left. The left optic disk showed some swelling along the nasal border. The right optic disk was hazy. The ophthalmic veins were moderately full. The pulse rate was about 75. The pupils were equal. He had marked photophobia. The cerebrospinal fluid pressure was 350 mm. of water. The fluid was opalescent. There were 2,300 white blood cells per cubic millimeter, 80 per cent of which were polymorphonuclears. On November 20 he had two chills. On November 21 the spinal fluid was clear. The concentration of sulfanilamide in the blood was 5.3 mg. per hundred cubic centimeters. A blood transfusion of 550 cc. was given. On November 29 the patient was drowsy but conscious and cooperative. He had incontinence of urine and weakness of the right facial nerve. He had weakness of the left arm and leg. He had a well sustained left-sided knee and ankle clonus. There was moderate nuchal rigidity. The rectal temperature was 101 F. The pulse rate was 72. On November 30 the left arm was weaker and edematous. On December 2 the neck was still stiff. There was slight movement of the left toes. He was practically in a vegetative state. On December 10 he was still in a vegetative state. On December 14 he had weakness of the right facial nerve and left hemiplegia. He had contractures of both arms and weakness of the neck. The following operations were performed with the patient under local anesthesia: (1) subtemporal decompression and drainage on the left, (2) bilateral occipitoparietal trepanations and (3) ventriculographic examination.

When the dura was opened in the subtemporal decompression, considerable cerebrospinal fluid escaped. There was no evidence of abscess of the brain. The ventriculogram showed the ventricles to be dilated. On December 23 the patient was emaciated and had contractures of the arms. He was being fed by continuous nasal drip. The cerebrospinal fluid was clear and colorless and contained 55 mg. of proteins per hundred cubic centimeters. On Jan. 2, 1938, the left hemiplegia persisted. The nuchal rigidity was nearly gone. There was some movement in the left leg. On January 30 there was definite improvement in the movements of the left leg. On February 7 the patient was discharged from the hospital. Massage and passive motions were to be carried out on the left leg and arm at home. Articulation was poor, but the patient had no difficulty in naming objects. The movement in the left leg was about 15 per cent normal. He had no voluntary movement in the left arm, which was flexed at about 60 degrees. The pupils were dilated but equal and reacted to light and in accommodation. There was slight weakness of the left facial nerve. The fundi were normal. The general condition was good. On April 5 he was able to walk fairly well and to raise the left arm to the level of the shoulder. He could hold objects in the left hand. On September 1 he had a slight contracture of the left hand. Mentality was normal. He was able to walk well.

DISCUSSION

DR. A. R. ELVIDGE: The case is extremely interesting. It seems to show the recent progress in chemotherapy for meningitis. The patient had acute meningitis, so virulent that it hardly seemed worth while to treat it. He had all the signs and symptoms of meningitis. He was treated with forced drainage and repeated lumbar punctures and a great deal of sulfanilamide. The organism was Str. haemolyticus. One thing of interest was that the patient became hemiplegic rather rapidly during the course of the treatment. One asked whether an abscess was developing. I did not think it was but felt that to be on the safe side the patient should have openings in his head. No abscess was discovered by injection of air. I considered the case one of hemiplegia due to thrombosis on the surface cerebral veins. The hemiplegia was ipsilateral, but the cortical veins could have been thrombosed on the opposite side just as easily as on the same side. This, of course, was purely theoretic. It is of interest that the hemiplegia came on when the intake of fluid was reduced for one or two days, at which time thrombosis apparently developed. This is a reason for supposing that the mechanism was

on a basis of thrombosis. It was felt that it was due to the low intake of fluid. Perhaps coagulation tests should be made on such patients. There is a patient in the Montreal General Hospital in whom a similar condition has developed.

DR. B. F. MACNAUGHTON: Until recently the results of surgical intervention have been bad in cases of meningitis in which Str. haemolyticus has been removed from the spinal fluid. Many patients who have not had organisms removed from the spinal fluid have recovered from the complication, for several reasons, first of which are adequate surgical intervention on the mastoid and chemotherapy. Blood transfusions, I think, have played an inmportant part, and last but by no means least is good nursing.

DR. W. J. MCNALLY: Eight such patients that have recovered have been recently reported on in the French literature. In addition to the administration of sulfanilamide by mouth in large doses, they had it introduced into the spinal fluid. It seems important to carry on sulfanilamide therapy after the symptoms have subsided, as recovered patients have sometimes relapsed and therapy has had to be reinstituted.

MENINGITIS DUE TO PNEUMOCOCCUS TYPE III FOLLOWING MASTOIDITIS, WITH RECOVERY. Presented by DR. KEITH HUTCHISON and DR. G. CHISHOLM.

A boy aged 10 years had a history of earache for five days; fever, vomiting and drowsiness for three days, and delirium for five hours. The right ear was normal. The left ear drum was red and bulging. He was incontinent. He responded only to painful stimuli. All the deep reflexes were exaggerated. The cerebrospinal fluid pressure was greater than 500 mm. of water. The fluid was milky. The Pandy reaction was 4 plus. There were 8,250 cells, 18 per cent of which were polymorphonuclear leukocytes. The blood determination was as follows: 5,150,000 erythrocytes, with 90 per cent hemoglobin, and 31,650 leukocytes. Urinalysis revealed albumin and dextrose. Paracentesis of the left ear drum was done on admission. The organism was Pneumococcus type III. On December 22 simple mastoidectomy was performed on the left side with exposure of the dura of the middle fossa, the lateral sinus and the cerebellum. The lateral sinus was incised. It bled freely and was packed. The cortex of the mastoid was sclerosed. There were practically no cells except in the region of the antrum, where necrosis and granulation tissue were found. Pneumococcus type III was found in the spinal fluid. The patient was treated with continuous intravenous administration of saline solution for four days and thecal drainage. Sulfapyridine (2-[paraaminobenzene sulfonamido]-pyridine) was given for sixteen days after operation. On January 6 the patient was bright and cheerful, eating and sleeping well. The temperature was 99 F. All reflexes were normal. The leukocyte count was 9,200. There was no elevation in the cerebrospinal fluid pressure. There was, however, some bloody discoloration as well as cloudiness, which did not decrease as the fluid escaped. There were 19 cells per cubic millimeter.

DISCUSSION

DR. A. R. ELVIDGE: This case shows what can be done with the new pyridine derivative of sulfanilamide, sulfapyridine. The patient is apparently the first with meningitis due to the type III pneumococcus in Montreal that has done well. There is another, in the Montreal General Hospital under the care of Dr. A. H. Gordon, with meningitis due to the type III pneumococcus in whom hemiplegia has developed. Against the type I pneumococcus I have tried type I antipneumococcus serum in large doses without producing recovery. Though present chemotherapy bespeaks a great advance in the treatment of meningitis it must not be forgotten that certain patients in the past recovered without such treatment. This is true of streptococcic meningitis. Two such patients I recall, one at the Montreal General Hospital, treated with forced drainage by lumbar puncture and forced administration of fluids and a certain amount of streptococcic serum, and another at the Montreal General Hospital, also treated with forced drainage and some serum. I know of no patients, however, with pneumococcic meningitis who recovered.

PROF. E. G. D. MURRAY: In experiments on animals it has been observed that though an infection has been checked it will recur if administration of sulfanilamide is discontinued too early. This should be borne in mind. Fleming's demonstration in experiments on animals of the much increased effectiveness of sulfapyridine when it is associated with active or passive immunity suggests strongly that more effective treatment is to be expected when the drug is used in conjunction with antipneumococcus serum of appropriate type. The reports of lesions due to this drug in animals prove it desirable to adopt methods which allow of reduced doses and increased effectiveness.

DR. G. CHISHOLM: There was a technical error in the bacteriologic laboratory when the cerebrospinal fluid in this case was examined. The bacteriologist was mortally certain that the spinal fluid contained Pneumococcus type III but would not swear to it.

CARCINOMA OF THE LARYNX TREATED BY LARYNGOFISSURE. Presented by DR. G. E. HODGE.

A man aged 59 was admitted to the Montreal General Hospital on July 3, 1938, with a history of progressive huskiness of the voice for four months. On June 16 a small papillomatous growth was seen on the right vocal cord near the anterior commissure. It was limited to the true cord. There was no limitation of the movement of the affected cord. The pathologic diagnosis was carcinoma, grade III. No other evidence of disease was seen. On July 4 laryngofissure and tracheotomy were performed with the patient under intratracheal cyclopropane anesthesia. The growth was found to extend the length of the right cord. The right true and false cords and the vocal process of the right arytenoid cartilage were removed. The thyroid cartilage was not resected. A tracheotomy tube was inserted. Two days after operation the patient became dyspneic, requiring oxygen, and was forced to spend one week in bed. On December 26 a few granulations were removed from the anterior commissure of the larynx, but no evidence of malignant growth was found. Local anesthesia could not be used in this case because of extreme nervousness. A balloon catheter was of value in blocking off the larynx and trachea during the operation and obviated the use of packing in the trachea.

DISCUSSION

DR. W. J. MCNALLY: The following comments have been offered by Dr. H. S. Birkett, who is unable to attend the meeting in person:

"In a case of persistent hoarseness, in addition to an indirect laryngeal examination, the patient should have a direct examination. If the condition is operable, one must choose between complete removal of the larynx and removal of part of the larynx. The next question is anesthesia. General anesthesia should be avoided, or if chosen it should be of a type that does not induce a long cessation of the cough reflex. Cyclopropane was given to the patient in the present case. A slight pulmonary complication followed the operation, but the patient recovered. Cyclopropane tends to cause pulmonary complications more commonly than do ordinary inhaled anesthetics; because of the high oxygen content, the lung is more prone to atelectasis. In performing laryngofissure one should always remember that if the growth involves the anterior commissure the larynx should be opened on one side of the midline. The synopsis recommends a rubber catheter and balloon. This is excellent advice, but the use of the device should not do away with gauze packing, which acts as a plug in absorbing blood. I should like to stress the need of after-care for these patients. They should have special nurses in wards. Also I should like to mention the need of suction at the bedside in order that the tracheotomy tube or the pharynx can be constantly sucked out. The surgeon should measure the distance on the catheter so that the nurse will know how far down to insert it in the tracheotomy tube. After operation the patient should be

placed in a sitting position as soon as possible. Orders should be given that the patient should receive nothing by mouth until twelve hours after operation; then sterilized water should be the first drink. The head should be held forward when drinking."

DR. R. P. WRIGHT: If one is sure that the lesion is intrinsic and of grade 1 or 2, it should be removed by operation. Malignant growths of higher grades must be considered and different methods used. For the lower grades laryngofissure is the operation of choice.

DR. G. E. HODGE: The patient had a small nodular growth on the vocal cord; the movement of the cord was normal, and there was no evidence of extension either to the anterior commissure or to the subglottic areas. Such a condition is considered suitable for laryngofissure. Jackson stated that any patient in good physical condition with such a growth, particularly with malignancy of grade 1 or 2, should have operative treatment. I have treated 1 patient with such a lesion with roentgen radiation. The growth was completely removed, with excellent results. If such an outcome is possible it would seem that operative treatment is not necessary, but today the consensus is still that laryngofissure is a necessity.

MIXED SALIVARY TUMOR OF THE SOFT PALATE. Presented by DR. A. O. FREEDMAN.

A man aged 67 was seen on Dec. 14, 1938. He complained of difficulty in swallowing for a few months. He had had a cough for twenty years and was treated for pulmonary tuberculosis twenty years previously. He was well nourished and well developed. Moist rales were present at the bases of both lungs. The local findings consisted of a smooth, rounded, doughy swelling in the region of the soft palate on the right side, which extended from ½ inch (1.3 cm.) above the upper pole of the right tonsil obliquely across the soft palate on the right side to the back of the hard palate just past the midline. The mucous membrane moved over it. The longest diameter was about 1½ inches (3.8 cm.). It was bilobar, the smaller lobe being near the tonsil. There was no enlargement of the cervical glands. On December 17, with the patient under local anesthesia, an incision was made over the tumor from the midline of the hard palate to the upper pole of the right tonsil. With blunt dissection, the tumor shelled out easily. It invaded the right side of the hard palate behind and the entire right side of the soft palate. The mass was constricted about its middle. The tumor was removed in toto and the incision closed. The tumor was soft, gray and irregularly ovoid, 3 cm. in length and 2 cm. in greatest diameter. It was enclosed by a gray capsule. The surface was irregularly lobulated. The tissue cut without gritty resistance. Microscopic examination showed a distinct capsule. Along the periphery were salivary glands with small polygonal cells that contained compact blue-staining nuclei. In many situations were acini which contained homogeneous colloid. Occasionally the cell masses merged with the stroma, which consisted of myxomatous tissue cells of stellate appearance. No cartilage was encountered. The pathologic diagnosis was mixed tumor of the salivary gland.

MIXED SALIVARY TUMOR IN THE TONSILLAR REGION. Presented by DR. A. O. FREEDMAN.

This case report was published in full in the July 1926 issue of the ARCHIVES, volume 4, page 14. Dr. Freedman added the following statements:

The deficiency of the uvula and soft palate was overcome by a dental prosthesis. It is now fourteen years since the operation. The patient is comfortable. There has been no recurrence.

CHRONIC SUPPURATIVE OTITIS MEDIA WITH LABYRINTHITIS. Presented by DR. R. P. WRIGHT.

A woman aged 20 was admitted to the hospital on April 22, 1920, with chronic suppurative mastoiditis on the left. She had had simple mastoidectomy in England twelve years previously. She had recently had spasmodic twitching of her face. There was no spontaneous nystagmus. There were a positive Romberg sign and a staggering gait. A loud voice was not heard in the left ear with a Bárány box in the right. The left labyrinth was hypoactive. The right ear was normal. On May 8 operation was refused, and the patient was discharged. She was readmitted on May 20 with more marked paralysis of the facial nerve. On May 22 radical mastoidectomy and drainage of the labyrinth were performed on the left. A large cholesteatomatous cavity was found. The facial nerve and the dura over the knee of the sigmoid sinus were exposed. The semicircular canals were opened with a curet. The wound was packed lightly. On June 4 a plastic operation was done, and a week later the patient was discharged; the facial paralysis had improved, and her general condition was good. Six years later, after she had been swimming, the mastoid cavity became infected, with return of the paralysis of the facial nerve and recurrence of vertigo. Granulations were cauterized, and after several months the condition cleared up.

CONGENITAL AURAL FISTULA. Presented by DR. W. J. MCNALLY.

A woman aged 36 had had a small opening in the skin just in front of each ear since birth. That on the left side had never troubled her. Four years before, after a severe illness, that on the right had begun discharging intermittently, irritating the surrounding skin. Examination revealed a small opening just above the tragus and in front of the anterior upper end of the helix on each side. A small amount of creamy fluid could be expressed from these openings. On the right side a probe could be passed inward for ½ inch (1.3 cm.). Around the opening on the right the skin was irritated, and the area of irritation was confluent with an eczematous region just above and behind the ear, where the auricle joined the scalp. There was eczema above and behind the left ear also, but the skin around the fistula on the left side was normal. These fistulas were the remains of the outer part of the first branchial cleft. The patient reported that her mother has similar openings in front of her ears but they have never given trouble. The patient is one of five children, and no other occurrence of this anomaly is known in the family. The fistula on the right side was excised, with the patient under local anesthesia. The fistula was carefully excised intact. It was found to extend inward about ½ inch (1.3 cm.). The cutaneous wound was closed, and recovery was uneventful.

CHRONIC SUPPURATIVE OTITIS MEDIA WITH PAROTID ABSCESS. Presented by DR. G. E. M. HILTON.

A man aged 47 was admitted to the hospital on Oct. 28, 1938, with a history of discharge from both ears for many years. The discharge from the left ear was more profuse, and that ear had been painful for three days. His temperature was 100 F. The canal of the left ear was occluded by a polyp. Considerable purulent discharge was present. The preauricular and the infra-auricular area were swollen and tender. The right ear showed a central perforation with moderate purulent discharge. Roentgenograms showed both mastoids to be sclerotic. No cell outline or destruction of bone was demonstrated. On October 29 the polyp was removed from the left ear. On October 31 the patient had a definite chill, with a temperature of 107 F. There was definite swelling over the left parotid area but no discharge from Stenson's duct. The condition progressed. On November 3 there was fluctuation with semipurulent discharge from Stenson's duct. The abscess was incised on November 6. Culture showed the infecting organism to be Streptococcus haemolyticus.

COMPARISON OF CARTILAGE GRAFT AND BONE GRAFT TAKEN FROM THE CREST OF THE ILIUM IN THE RECONSTRUCTION OF SADDLE NOSE. Presented by DR. B. F. MACNAUGHTON.

CASE 1.—A man aged 23 had a depressed nasal bridge following a blow in 1932. Eight months later an ivory implant was tried. This had to be removed five months later because of necrosis of the skin. On Dec. 15, 1938, the bridge was raised by a bone graft taken from the right iliac crest.

CASE 2.—A man aged 34 gave a history of a fall at the age of 7 years resulting in marked saddle nose. In 1931 an implant of celluloid was placed in the nose but extruded some months later. On February 2 the nasal bridge was raised by means of a cartilage graft. On February 9 the patient was discharged.

The results have been fairly satisfactory in these cases. In each case scarring from previous operation prevented raising the bridge of the nose sufficiently high to give a perfect cosmetic result. While both methods will give satisfactory results, the use of a bone graft taken from the iliac crest appears to have the following advantages: 1. During the operation there is no danger to any important structure, whereas with a cartilage graft difficulties with the pleura may be experienced even by the expert. 2. From the patient's standpoint, the pain following the operation is less than when costal cartilage is used. The time of healing is approximately the same in both cases. 3. A bone graft will apparently withstand a greater amount of sepsis than will a cartilage graft. 4. A bone graft has the disadvantage of being more rigid in the formation of the nasal bridge and may possibly be more prone to injury, but it is much less liable to become twisted or distorted than is cartilage.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY

THOMAS W. LEWIS, M.D., *President*

Regular Meeting, Jan. 9, 1939

WALTER H. THEOBALD, M.D., *Secretary*

TINNITUS: ETIOLOGY AND EVALUATION OF THE VARIOUS METHODS OF TREATMENT. Presented by DR. DANIEL B. HAYDEN and DR. EDWARD L. CHAINSKI.

One of the most distressing symptoms encountered in otologic practice is head noises. As a rule, the patient does not object so much to the accompanying loss of hearing and would even be willing to sacrifice his hearing entirely if thereby he would be relieved of the constant roaring in his head. Tinnitus has been classified into two types: that which occurs in the ear itself, caused by impairment of the auditory conducting apparatus, which is called entotic, and that which is purely a disorder of the sound perception apparatus, or subjective head noises. Whatever the classification, the underlying cause or causes must be thoroughly and systematically studied. Tinnitus and deafness are usually parallel, although not invariably so Tinnitus may occur independent of an aural disease or may be aggravated by some underlying general condition.

Complete physical and laboratory examination and careful history taking are essential in the evaluation of methods of treatment. The patient's habits of life and his nervous temperament should be studied. Factors which may tend to increase the intensity of the condition should be eliminated so far as possible, and habits or surroundings which may make the tinnitus less noticeable should be advocated.

No one truly satisfactory medicinal remedy for tinnitus has as yet been found; various sedatives, vasodilating substances, endocrine substances and other medicaments have been tried, occasionally with success. Various workers have reported satisfactory results with such treatment in several series of cases. Mechanical and thermal methods of treatment also have been used extensively in both America and Europe. Occasionally, cures by dietetic or psychologic treatment have been reported. The use of roentgen radiation and of radium does not appear to be attended by any definitely successful results.

Various surgical procedures have been reported in the literature, some of which have been attended with success. Cases of tinnitus in which surgical intervention is clearly and unequivocally indicated are rare, however, and it seems advisable to trust to conservative measures for relief.

The following conclusions may be reached:

1. Tinnitus is unquestionably one of the most distressing symptoms with which physicians have to deal.

2. Its causes are numerous, and it may require the services of an internist, an otolaryngologist, a neurologist or even a dental orthopedist.

3. When one is called to treat tinnitus, it should be tagged as "curable" or "incurable."

4. If it is curable, the physician should devote himself to effecting a complete cure and not merely applying symptomatic therapeutics.

5. If it is incurable, every means must be exhausted to give the patient as much relief as possible.

6. Perseverance in the use of various measures will give the patient courage to carry on.

7. A defeatist attitude will lead the patient to despair, if not to actual suicide.

DISCUSSION

DR. EDWARD CHAINSKI: Although tinnitus is generally considered a symptom, it frequently presents itself as a disease. A patient may be relieved of the condition responsible for the tinnitus, or the pathologic condition producing the tinnitus may cause him little or no concern, yet his life is made miserable by incessant head noises.

The condition was at one time dismissed with the callous remark to the patient, "Sorry, I cannot do anything more for you." This attitude is no longer being tolerated by either patient or physician, as was forcibly brought home by the number of requests from lay people and organizations for reprints of the paper read before one of the sections of the American Medical Association at the San Francisco meeting.

One gathers from the paper that the problem is not simple. What can be done for patients with tinnitus? The textbooks on otology do not offer much in the line of treatment. They usually divide the condition into a curable and an incurable type, and unfortunately in most cases persistent tinnitus is of the latter type; it is to this type that the paper refers. It does not offer a new or spectacular treatment or tell of any short cuts in the management of the condition, yet I believe it does outline the proper procedure for the care of patients with tinnitus; one is often pleasantly surprised at what one can accomplish once one tries. Not uncommonly, after various forms of treatment have been tried, the patient volunteers the information that the intensity of the tinnitus has changed or diminished and that he is able to put up with it. Psychologic? Maybe, but one must remember that most patients consult a physician primarily for relief; it was said of Osler that many of his successes were due to treating patients with kind words and fresh air.

In reviewing the literature on the subject one is struck with the difference between the reports from the United States and those from Europe. The American otologist is concerned with reporting specific cures. He is inclined to apologize because he has to resort to one treatment after another without results. In the foreign literature, which is more voluminous, one reads reports of cases in which all methods of treatment were used over many years and finally resort was had to radical surgical procedure if warranted. At this meeting those present are extremely fortunate to be able to hear of a more recent approach to the problem, for although fenestration is done primarily for the relief of deafness, all otologists know that tinnitus is frequently an early, and not uncommonly a most annoying, manifestation of otosclerosis. It will be interesting to hear of the results obtained by Dr. Lempert and the various discussers.

Dr. Austin A. Hayden: May I add some personal observations on the subject of tinnitus? I have recently been relieved of tinnitus in my left ear. To the causes of tinnitus recited and classified by Dr. Hayden, I wish to add two. My own, I feel sure, was due to excess of uric acid. It was not very disturbing but had been constant for six or eight months. At a general physical examination, which I had at St. Joseph's Hospital, the uric acid estimation was 8.1 mg., which is high. When the estimation was reduced to 4 mg. I had no more tinnitus in the left ear. It had been reduced to 2.6 mg. when I left the hospital, and I have had no head noises since.

In addition to the consideration that was given to allergy I should like to venture the opinion that, while allergy may work in the middle ear itself, it probably produces tinnitus not infrequently through mechanical obstruction of the eustachian tubes. In that connection I wish to mention what I should designate as occupational tinnitus. I have recently made some studies on a group of men who work where the noise level is high. For thirty minutes to an hour after a six hour day, these men, almost without exception, have tinnitus in each ear, and it is interesting to note that the tinnitus is of about the same pitch as the noise in which they work.

I wish to take exception to what Dr. Hayden has said about the slight value of therapy. Much depends on what is meant by therapy. Within the last three years a member of my own family committed suicide because of tinnitus. I feel that I was partly to blame, because I gave to that person the exact impression that this paper may be construed to give. Although Dr. Hayden's conclusions mentioned suicide, it is not sufficiently remembered that the person who is subjected to explosions, constant bell ringings and other noises needs the most careful handling, psychologically, therapeutically and in any other way, to give relief.

I was glad the eustachian tube was mentioned, because I believe many patients are relieved by its catheterization, with or without the addition of massage and with or without the introduction of any medicament into the tube through the catheter.

It was a strange thing, in the industrial examination to which I referred, that, while the tinnitus complained of was of low pitch, corresponding to the noises in the room, the defect in hearing in every subject that I examined was at the uppermost end of the scale. In some cases it began at 2000 and was marked at 4000 and great at 8000.

Dr. Howard C. Ballenger: Two or three years ago at Northwestern University Medical School my colleagues and I were treating a series of patients with various kinds of deafness by means of musical tones generated by an electrical apparatus. The primary attempt was to treat the deafness. However, most of the patients had tinnitus. We kept charts and records of the tinnitus and the effect of treatment by sounds and noises. As a rule, the tinnitus was not improved. However, in a few cases we concentrated the sound at about the same frequency

as the tinnitus, and there seemed to be improvement in some of these. In such cases, if an excess of stimulation by sound occurred and the tinnitus was lessened, hearing acuity was also decreased for that frequency. This is in accord with the known fact that any excess stimulation of the auditory nerve by noise or concussion will produce partial deafness. The number of patients treated was too small for the results to be other than suggestive; however, it might be possible by further experimentation to develop a technic for treating tinnitus, but at the sacrifice of some hearing at the frequency of the stimulating sound.

IMPROVEMENT OF HEARING IN OTOSCLEROSIS: REPORT OF SEVENTY-THREE CASES. Presented by DR. JULIUS LEMPERT, New York (by invitation).

The fenestration advocated for the improvement of hearing in otosclerosis is an endaural, plastic reconstruction of the auditory mechanism for the creation of a new permanent air conduction apparatus. It is based on definite surgical principles. The degree of improvement in hearing which is obtained as a result of such plastic reconstruction of the auditory mechanism in an otosclerotic ear depends directly on, and is in direct proportion to, the exactitude and perfection with which each major step in the technic is completed, plus the finesse employed in the execution of each and every one of the minutiae of the technic.

The fenestration herein described has been performed on 73 patients. These may be divided into two groups, the first consisting of 42 patients who had good bone conduction and were suitable for the operation and the second consisting of 31 patients whose bone conduction was poor. The latter patients were operated on at their own request and insistence in each instance, in the hope that they might derive some improvement in hearing, no matter how slight.

For the first group (those who had good bone conduction) 35 operations resulted in a high degree of permanent improvement in hearing in the treated ear, and the patients now enjoy good practical hearing and are socially and economically rehabilitated. In 7 cases in this group the hearing was not improved and remained at its preoperative level. The hearing was improved in 83 per cent of the cases in this group.

In the second group (those who had poor bone conduction), 9 patients showed a good improvement in hearing; in 20 the hearing remained at the preoperative level, and in 2 it was further impaired. The hearing was improved in 29 per cent of the cases in this group.

From this analysis of results for the patients subjected to the operation, one can readily see that in a high percentage of properly and carefully selected cases it yields a high degree of practical improvement in hearing.

Tinnitus either was greatly improved or disappeared postoperatively in the vast majority of cases.

Though an improvement in hearing was obtained and maintained in only 44 cases, the newly created fenestra remained permanently open in 62 of the 73 patients operated on.

The improvement in hearing obtained by fenestration is in the air conduction. The bone conduction remains unchanged.

The fenestra created in the external semicircular canal can be maintained permanently open by employing the technic which has been described. Of the 73 patients operated on, the fenestra remained permanently open in 62 and closed in only 11, making ultimate closure the exception rather than the rule.

Osteogenesis is not the only cause of closure. Fibrous tissue finding its way into the fenestra will result in closure and prevent the mobilization of the perilymph and endolymph by air conduction. In the 11 cases in which the fistula

closed, a revision of the fistula in the external semicircular canal revealed new formation of bone to be the cause of closure in 9 cases and fibrosis in 2.

Dr. Norton Canfield, of Yale, demonstrated experimentally that when a defect was created in bone with the polishing burr employed in this procedure, regeneration did not take place. All defects made with sharp instruments and burrs were followed by regeneration of bone.

A membrane must be employed to seal the fenestra by surgical means in order to maintain the improvement in hearing. When the fenestra is created in such a manner that regeneration of bone does not follow, it would still close as a result of fibrosis unless surgically sealed with a suitable membrane. The membrane employed to seal the perilymphatic space must be the thinnest and the most readily vibrating possible, so as to interfere least with the mobility of the perilymph.

The improvement in hearing following fenestration is functional and not psychic. It is always possible to substantiate audiometrically the degree of improvement claimed by the patients.

The following conclusions may be reached:

1. The Lempert fenestration, when carefully and correctly performed, will result in a high degree of practical and permanent improvement in hearing in properly selected cases of otosclerosis.

2. The operation should not be regarded as just another technic added to the list of operative procedures on the temporal bone. It blasts a trail for a new and different type of surgical intervention on that structure, based on different surgical principles from any procedure heretofore employed for the relief of its suppurative lesions. The best results will be obtained from this procedure by otologists who have a thorough knowledge and understanding of the principles of plastic reconstructive surgery or by plastic surgeons who have a thorough knowledge and understanding of the anatomy of the temporal bone.

3. Owing to the surgical delicacy and precision required to alleviate deafness in otosclerosis and owing to the difficulty of determining in advance the suitability of a particular patient to the operation, intervention for the relief of deafness will result in a percentage of failures varying with the otologist's diagnostic ability and surgical skill.

4. In fairness to the already successful development of the surgical treatment of otosclerosis and for the protection of its still brighter future, no otologist, no matter how skilful a surgeon he may be, should attempt this operation without having received special training in this type of surgery under supervision and guidance.

DISCUSSION

Dr. Jerome Strauss: I have met Dr. Lempert in New York and have talked with him at great length; I have stood behind him at the operating table, and I have chatted informally with a representative number of the patients on whom he has operated. For any one who has done these three things, but one conclusion is possible: that Julius Lempert is a unique surgical genius and master of the anatomy of the temporal bone.

A few years ago a delegation of the members of this society returned from a meeting of the American Academy in New York and reported having seen an endaural surgical approach to the mastoid for acute and chronic disease. One got the impression that the incision was a clever manipulation, but that it was considered more or less as a surgical stunt, designed primarily for cosmetic end results. These men, returning to Chicago, spread what were to some extent the opinions of prominent eastern otologists at the time regarding both the meatal incision and its originator, in short, that both were something to talk about rather skeptically.

Two years passed, and it would seem that the surgeon who had been demonstrating this incision was now using it primarily as a stepping stone to greater procedures within the temporal bone beneath. From the completely changed attitude toward him and his work in the East, it is now manifest that his study and close application to the problems of the temporal bone are beginning to bear fruit, and no one who visits Dr. Lempert, whether for a day or for a month, fails to be impressed with the man himself and the work he is doing. Even among his most antagonistic colleagues, who may at one time have questioned his impulses and medical character, he is now hailed as a surgical genius who has made a real contribution to the surgery of the temporal bone, and he has at present among his friends and sponsors some of the best known American otologists. Indeed this complete reversal of opinion in so short a time appears to those familiar with the details as a truth that is stranger than fiction.

As to the man himself, I saw Dr. Lempert as an indefatigable worker and an artist. The artist in him finds expression in the collection of many canvases and heterogeneous objects of art. As a worker he appears to be tireless, maintaining a busy office practice throughout the morning and performing these patience-taking, time-consuming operations in the afternoon. He finishes his day's work by dissecting cadavers until all hours of the night, either for himself or with men who are taking private courses in this work under him.

The operation for improvement of hearing done by Dr. Lempert is probably the most difficult, complex and lengthy procedure in any field of modern surgery, and his genius is well demonstrated by his infinite capacity for taking pains in such stages of the operation as the cautious fenestration of the semicircular canal, the slow, delicate dissection of the tympanocutaneous flap and the careful preparation of its bed. The operation I was privileged to witness lasted four and a half hours, with no wasted motion and no time out.

Dr. Lempert was exceptionally candid and hospitable during his office hours and placed all his patients who were making postoperative visits at the unrestricted disposal of his medical visitors. The patient whom I saw who had the longest postoperative interval had been operated on eleven months previously; the one with the shortest interval, three weeks previously. The only member of the group whose progress was unsatisfactory to Dr. Lempert was this most recent patient, who responded to the fistula test somewhat sluggishly in comparison to the others, who reacted with a terrifyingly active nystagmus. Two of the patients seen on this day volunteered the information that they had been spared the loss of sustaining employment by the improvement in their hearing.

How long the improvement will last is still, of course, an open question, but there is no longer any doubt that Dr. Lempert's method is more nearly permanent in result than any previously attempted procedure for artificial fenestration. He himself made no extravagant claims, and except for stating that if the fistula lasts from six to eight weeks he believes it to be permanent he was content to let his results speak for themselves.

There is but one profound criticism to be offered in connection with this magnificent technical procedure, providing, of course, that the fistulas remain permanent —and that is its unusual complexity. Granted that time will prove the outcome successful in a large percentage of cases, this serious drawback still presents itself. For, although hundreds of thousands of the deafened may clamor for relief through this operation, the sad truth is that the general rank and file of otologists will never be able to do this superspecialized work in the way in which Dr. Lempert does it, and the penalties for a misstep are unfortunately great.

DR. JOHN R. LINDSAY: I have had the privilege of visiting Dr. Lempert and spending some time with him. I have watched him perform the various steps of the operation on several occasions and have had the opportunity of examining

patients who had been operated on at various times, some as long as nine months previously. I was impressed with the special degree of preparation and training necessary for this meticulous type of surgical work. I was impressed also when I examined the patients who had been operated on. There is no doubt that the fenestra has remained open, and there is no question about the marked degree of improvement in hearing in patients who had been operated on as long as nine months previously.

Some interesting points have been brought out, I believe, by Dr. Lempert's work. One is that the most favorable condition for operation is fixation or ankylosis of the stapes, with a free round window niche and membrane and good bone conduction. This is the condition also in which best results are attained with bone conduction hearing aids. It must be admitted, however, that at the present time there is much objection on the part of many persons to wearing hearing aids, and it is true that in some occupations workers lose their employment when their hearing is reduced so as to require them to wear such an aid. Regardless of what the situation may be in the future, this is the condition today. Good results have apparently been obtained only in those cases in which the cavity of the middle ear has been completely sealed off from the external ear and mastoid cavity. This is in harmony with physiologic facts that have been demonstrated experimentally. It may be that the size of the remaining cavity of the middle ear is a factor in the result. The reason that the fenestra has remained open after Dr. Lempert's operation, while after those of previous workers it has closed, does not as yet seem to be entirely established. The suggestion that the laying of Shrapnell's membrane over the fistula may be responsible for keeping it open does not seem to be a satisfactory explanation, since the inner surface of the membrane consists of epithelium and the lateral process of the malleus lies at its inferior margin. The experimental work that has been presented seems to indicate that the polishing burr may be an important factor in the prevention of osteogenesis. It would seem that a longer time must elapse before this point can be proved.

Dr. Samuel J. Pearlman: I think it must be obvious that this presentation has been most unusual. Every one knows the hopeless attitude otologists have had toward the treatment of otosclerosis. No one in the United States, or in the world, for that matter, has brought the operation under discussion to a higher plane than Dr. Lempert. A few otologists in Europe have done the work; one does a two or three step operation requiring several months; another, a man honored among otologists, has done the operation over many years and on occasion has abandoned it. He uses gold leaf for covering the fenestra, which, in my opinion, cannot compare with Dr. Lempert's flap of membrana tympani. Dr. Lempert's procedure seems to be a technically perfect operation conceived by a person with a high degree of surgical imagination. At one step all the necessities for a proper result are obtained by the use of a viable flap made of the thinnest conceivable living tissue to cover the opening in the labyrinth.

Seeing the figures and knowing that Dr. Lempert has been observed for months by otologists—some of them exceedingly critical—one will have to say that a great step forward in the treatment of otosclerosis has been made. I will say further that even though the operation is of highest technical difficulty it should, after practice, be easy in the hands of the more skilful; I should be disappointed if it were shown or thought that only one man could ever do it. I should like to feel that as time goes on otologists of sufficient skill and proper training under careful supervision all over the country will be able to do this operation. If numbers of otologists can do it—difficult though it is—following the injunctions laid down by the person who has developed the procedure, definite and important progress will have been made in the treatment of what is the commonest cause of severe deafness in the young adult.

Dr. George E. Shambaugh Jr.: The society is fortunate indeed to have such a distinguished otologic surgeon present such an important contribution to otologic surgery. For the first time there is offered a reasonable hope for restoring practical hearing to patients with otosclerosis by a single stage surgical procedure.

Ten years ago Dr. Lempert introduced the endaural extracartilaginous antauricular incision for simple and radical mastoidectomy. The advantages of the endaural approach for radical mastoidectomy are so evident to any one who has used it that I venture to predict that in another ten years the endaural route will be the accepted one. I have done four radical mastoidectomies endaurally and will never again use the postaural incision for this procedure. The advantages of the endaural approach for simple mastoidectomy are less evident, and it will be slower in gaining general acceptance, but I believe that eventually the Lempert endaural approach may replace the postaural incision for all mastoidectomies.

Two years ago Dr. Lempert introduced the approach through the carotid artery for the exenteration of the petrous apex. In cases of closed empyema of the apex without an accessible fistula or in those in which evisceration of the apex is required, the Lempert operation is the best approach. I have had occasion to use it. Four months ago a child aged 7 years was brought to me with beginning meningitis, a temperature of 104 F., a recently acquired stiffness of the neck and 1,180 cells in the spinal fluid, ten days after simple mastoidectomy for staphylococcic otitis media. Because of the history of intermittent ocular pain for a week and because roentgen examination showed coalescent petrositis, immediate operation on the petrous pyramid was advised. Skeletonization of the basal labyrinthine portion of the pyramid failed to reveal any suppurative focus or a cell tract leading to the apex. The Lempert technic was then employed to enter the petrous apex, an abscess cavity containing several cubic centimeters of pus being evacuated. Recovery was uninterrupted and complete.

With regard to Dr. Lempert's presentation, his results speak for themselves.

I have employed the Lempert operation for 7 patients with otosclerosis during the past six months. The first patient was submitted to operation on July 13, the ear with poorer hearing being used. The various steps of the procedure were successfully accomplished with improved hearing, which five weeks after operation was sufficient so that the patient heard definitely better without his hearing aid than he had been able to hear with it before the operation. The fistula then began to close, and the reaction to the fistula test was gone seven weeks after operation, with partial loss of the improved hearing. The ear which was operated on, however, continues to have the better hearing.

The second patient was submitted to operation on July 20. The membranous flap was created successfully, and the fistula into the horizontal canal was made, but the membranous labyrinth was ruptured accidentally in making the fistula. There was immediate tremendous improvement in hearing that lasted two days, after which the hearing became poor. There was no reaction to the fistula test until two weeks after the operation, when the reaction returned, indicating regeneration or repair of the membranous labyrinth. The hearing gradually improved until the ear which was operated on had definitely the better hearing. The fistula remains open. In the third patient serous labyrinthitis developed the day after operation, with loss of vestibular function, but the hearing remained about the same. The fourth patient obtained temporary improvement, but the reaction to the fistula test had begun to diminish six weeks after operation, with loss of the slight improvement. Mild serous labyrinthitis then developed, with further loss; the hearing is beginning to improve but is still below the preoperative level.

The operation on the fifth patient was carried out successfully, and the fistula has remained open, but no improvement in hearing occurred either while the

patient was on the table or subsequently. In this case again the membranous labyrinth was ruptured, but repair occurred, and there is now an active response to the fistula test. The explanation of the failure to obtain improved hearing is possibly occlusion of the round window along with the oval window.

The sixth and seventh patients, operated on two months ago, each obtained a good temporary result, especially the last patient, who experienced extraordinary improvement in hearing. In both these patients, however, the fistula was enlarged with a sharp curet, a procedure that is now known to stimulate osteogenesis, and both fistulas have closed.

As can be seen, my results have been meager. Although the essential steps of the operation have been successfully accomplished in each case and in no case was the flap torn or the incus dislocated, the meager results are due not to the operation but to the operator. Of especial interest is the rupture of the membranous labyrinth without destruction of the function of the horizontal canal or the hearing. Secondly, even when the fistula closes there may remain a definite improvement in hearing, so that the operation on the previously worse ear makes it now the better.

Dr. Lempert must be commended for the way he has carried out this work on the highest possible ethical plane. He withholds nothing; he emphasizes his mistakes and his failures along with his successes, and his only interest has been in seeing that the work succeeds and progresses, not only in his own hands but in the hands of others. He has spent an extraordinary amount of his time, patience and energy instructing others in this most difficult and delicate and most meticulously exacting of surgical procedures. His purpose in emphasizing that no one should attempt this work who has not received special instruction is purely to protect the work from the disrepute that it will meet if the operation is attempted without the necessary preparation.

Dr. Joseph C. Beck: I wish to voice my appreciation and my admiration of the work presented. Ten years ago I visited Dr. Lempert because I heard that there was a "wonder boy" in New York, and I came away not pleased. He impressed me rather poorly, except for the kind way in which he received me. His work did not satisfy me, because my training had been orthodox, and his demonstration was a departure. Therefore, I did not react favorably to anything he said, personally or in print. I began to change my mind when that galaxy of Chicagoans, referred to by Dr. Strauss, my own associate Dr. Guttman among them, returned and described Dr. Lempert's work; but I still was not altogether in sympathy with it. I think, however, that every one appreciates now that this was a mistake on my part.

In Sweden, in 1927, I visited Uppsala and Stockholm and saw Bárány and Holmgren do the operation for fenestration of the horizontal semicircular canal. In 1931, at Michael Reese Hospital, I performed an operation for the fenestration of the horizontal canal on a young woman with otosclerosis and had a remarkable result. After she was returned to bed from the operating room she said the voices she heard were too loud, and she had not heard anything like that for a long time. Also she lost the tinnitus from which she was suffering, and I was much pleased. My operation was done with the burr, but the Swedish otologists used sharp chisels and curets. The burr had not up to that time been used universally in general surgical procedures on the mastoid in this country. I have employed it for years. But using it in the way Dr. Lempert has described is something which has always been avoided, because of the hazard of burning the bone and causing subsequent sequestration.

I should like to ask Dr. Lempert whether the age of the patient may have anything to do with osteogenesis and whether that is a consideration in determining

the success of the operation. It is known that reparative osteogenesis is much greater in younger persons. I should like also to know whether he considers that the inner lining of Shrapnell's membrane and the tympanic membrane proper, which are covered with epithelium, play a part or that the epithelium is transformed into fibrous tissue and becomes adherent over the made fenestra. That is one factor which occurred to me as possibly responsible for the nonclosure of the opening.

Brunning refered to operations for otosclerosis in the *Zeitschrift für Hals-, Nasen- und Ohrenheilkunde* and gave a review of the literature. Lempert has been known for some time, but not a word was said about him by Brunning, although many others were mentioned. I feel that this is unjust. Then I see that the English also have reported on this work in the *Journal of Laryngology,* and in particular Howard is reported to have operated by fenestration of the canal on several occasions. It was said that closure is universal and that the operation is a failure. Brunning brought out an operation on the superior semicircular canal by which, he said, it is much easier to keep the fenestra open.

Dr. Alfred Lewy: One must realize, after listening to Dr. Lempert, that this may be the eve of an epoch-making event in otology. It sounds like the realization of the otologist's dream. But it is necessary to be careful. Medical history is replete with operations that were successful and brought great credit to their originators for a time and then went into the discard. In 1876 Kessel began removal of the malleus, incus and membrana tympani for suppurative deafness, and the procedure was used by Lucae in 1885 for nonsuppurative deafness. Many other operations have been devised, most of which I am omitting, but I want to mention removal of the stapes, which was done by Blake, of Boston, and Jack, also of Boston, in 1892. In 1894 Jack reported his results in 60 cases as discouraging. The operation of fenestration or fistulization of the external wall of the labyrinth was done by Floderus in 1899. After dissections, microscopic study of serial sections and animal experimentation, he suggested what he called "sound fistulas" in the labyrinthine wall near the oval window or in the horizontal semicircular canal. This preceded Bárány's work and that of Sourdille and Holmgren. It is perfectly possible that the failure these men encountered, which led to their discouragement, was due to faulty technic.

Dr. Lempert's work on 42 patients was presented before the American Otological Society by Dr. Kopetzky. The discussion was opened by Dr. Wishart, of Toronto, Canada, who had visited Dr. Lempert twice, seen him operate and examined some of his patients. He spoke in the highest terms of Dr. Lempert's exquisite operative skill, but expressed himself as dissatisfied (through no fault of Dr. Lempert's) with the result of his own investigations of the hearing before and after operation. He felt that the evidence was inadequate to justify forming any opinion as to the end result of the operation. Not enough time had elapsed. Since then more time has elapsed, and Dr. Lempert has some excellent reports to make. Dr. Wishart's opinion seemed to be the consensus of other members of the society in the discussion that followed. They believed that the patients had not been adequately examined before or after operation by a sufficient number of physicians. That, of course, will be corrected in time.

In view of the history of surgical procedures, I am glad that Dr. Lempert in his closing paragraphs was careful to say something along the same lines, to warn his hearers not to be too enthusiastic until enough time has elapsed for mature judgment and to warn them also that the operation must not be undertaken without adequate surgical preparation on the part of the operator.

In closing, Dr. Wishart remarked that one never would know until a Scotch doctor from Missouri made observations on a Scotch patient from the same state. That, of course, is the way in which scientific medicine advances.

As one looks into the canal and sees Shrapnell's membrane, it does not appear to be wide enough to cover a 6 mm. trough. Perhaps if it is dissected free there will be found to be more of it. I have not done the operation, and I do not know the answer.

DR. SAMUEL SALINGER: If one were to cite all the operations for otosclerosis which have been tried and discarded since 1876, one could take up the entire evening. Dr. Lewy touched on a few of them, but it all comes to the same point, that no one has ever been able to maintain the fenestra in the canal or promontory, or wherever it was placed, for a sufficient time to justify the claim of permanence. Witmaack's operation on the superior canal went further than any that has been mentioned; he excised a portion of the dura to allow the arachnoid to come in contact with the membranous canal. That procedure improved the tinnitus but did nothing for the hearing. I, too, had the pleasure of seeing Dr. Lempert do his operation, and I must admit that I was much impressed with the details of the procedure, as well as with the great technical skill displayed by the operator. In fact, I made the statement to Dr. Lempert that not more than a dozen or fifteen otologists in the country were capable of carrying out the technic as he did. As for the duration of the procedure, one must bear in mind that operations on the brain or spinal cord lasting more than four hours are not uncommon. Surely, if the neurosurgeon can stand for six hours over a tumor of the brain, there is no reason why the otologist cannot carry out an equally protracted operation, if the procedure is justified. However, this procedure will fall into discredit if it is done by inadequately trained operators. Old men cannot learn it. It is for the young otologists to begin on, who have sufficient time and plenty of stamina. I believe that enough otologists can learn to perform the operation as Lempert does it so that eventually sufficient evidence will be accumulated as to its ultimate value.

DR. T. C. GALLOWAY: I should like to make up for Dr. Pearlman's modesty. The endaural approach has been used in mastoidectomies at Cook County Hospital, and its value, practicability and reasonableness have been impressive.

Probably everything said about the difficulties of the operation for fenestration is correct. It must not be done without a good background of experience, anatomic knowledge and skill. For that reason at Cook County Hospital the trial of the fenestration operation has been delegated to Dr. Pearlman, and he has operated in a number of cases.

The patients have progressed well; the time since the operations is not long enough to permit determination of the final results, but there have been remarkable improvements in hearing. I wish Dr. Pearlman had brought a patient seen this morning. The wound is well healed; a smooth flap extends over the fenestration; the patient is in excellent condition, and the hearing is nearly normal. Dr. Pearlman evidently has been able to master the procedure, and I think other otologists can follow in Dr. Lempert's footsteps.

DR. JULIUS LEMPERT, New York (by invitation): I should like to tell Dr. Shambaugh why the ear on which he operated in 5 of his 7 cases became the better ear in spite of the closure of the fistula. Even when a fistula closes, because of either regeneration of bone or fibrosis, the possibility exists that the new wall covering the membranous labyrinth is not as thick and as firm as the original bony labyrinthine capsule. This results in some mobility of the perilymph, which may account for the 5 or 10 decibel increase in hearing which results in such cases.

In reply to Dr. Beck's remark with regard to the effect of heat produced by the burr, the polishing burr is employed in such a manner that at no time is real heat produced. I make only two or three strokes at a time with the burr and then stop, employing little pressure with each stroke. With regard to the effect

of age on regeneration of bone, so far as I have observed it age does not seem to make any difference. In 9 cases new bone formed; in 2 fibrosis occurred. The ages of the patients varied between 19 and 45. Most of the entire group were young; the ages ranged from 17 to 55. Age is no contraindication to operation, provided the health is perfect.

Whether Shrapnell's membrane has anything to do with prevention of osteogenesis I do not know. But I do know that it is important to seal the fenestra with the thinnest possible vibrating membrane in order to maintain the necessary mobility of the perilymph and endolymph and that this membrane should be not an independent membrane but rather a part of a larger membrane with a good blood supply. It is for this reason that I seal the tympanic cavity with the membrana tensa and extend the membrana flaccida backward to cover the fenestra in the external semicircular canal.

Dr. Lewy stated that Dr. Wishart said he was unable to make a proper analysis of the audiometric readings in the cases reported. This was because Dr. Kopetzky did not send the paper to him in time to permit such analysis. The reason that Dr. Wishart did not receive the paper ten days prior to the presentation by Dr. Kopetzky, as promised, is something that I cannot go into now, for this is neither the time nor the place for such a discussion. Every patient who was operated on had an adequate examination before and after operation, not only by me but by other, most prominent, otologists in the city. Every patient who will submit to this operation has made the rounds and consulted most of the reputable otologists in his community and often in different parts of the country and of the world. The patient who submits to this operation does so only after all other available methods of treatment have failed. Furthermore, it is difficult to conceive how any patient who can hear will seek and submit to surgical intervention for the relief of deafness.

My patients are all private patients. Every one of them has always stood ready to be examined and has been examined by some of the most prominent otologists in the country. Any otologist of standing who asks to see my material is always welcome not only to see the patients but to witness operations and examine the patients before and after operation. Many otologists have seen the patients regularly before and after operation, so that there never can be any question about their hearing.

Dr. Wishart has been doing work on cadavers himself for many months, and I believe that he has already started to perform operations for otosclerosis. In answer to Dr. Lewy's question, Shrapnell's membrane can be made to cover the fenestra in the semicircular canal by liberating the tympanic membrane from the sulcus tympanicus, leaving it attached only to the anterior and inferior walls of the sulcus. The tympanic membrane is extended in a posterior direction until it reaches far enough to cover the external semicircular canal.

Dr. Salinger and Dr. Galloway both spoke about the mastering of this operation. It is not a one man operation. Any otologist with good understanding of the anatomy and surgery of the temporal bone plus a keen understanding of the principles of plastic surgery, after dissecting a dozen cadavers under the guidance of some one who has done this operation, will readily master this technic. Many otologists will be able to do it. It is time consuming only in the beginning, when the surgeon is not quite familiar with the technic. It has taken me from three to six hours. One surgeon whom I trained took eight hours for his first operation and five hours for his second. He has done six operations, five absolutely successful. He was a well trained surgeon, from the Mayo Clinic. It is not necessary to take a course; it is necessary only to apply oneself and to see the operation done a number of times by one who knows the technic. Failure to execute correctly the minutiae of the technic, even such small details as the placing of the

paraffin mesh, may mean a completely unsuccessful operation. These things are most important to the end result, but their proper performance can easily be learned. One way to learn it is through bitter experience by oneself, and the other is by the guidance of some one who has gone through this bitter experience. The operation can be done and will be done by anybody who understands the anatomy of the temporal bone.

I wish to thank the president and the society for permitting me to present this work, and I assure every otologist from Chicago who is interested in this work and in seeing the patients that my institution, my office, my patients, my cadaver material and I are at his disposal at any time.

Book Reviews

Diseases of the Nose, Throat and Ear. By W. Wallace Morrison, M.D. Price, $5.50. Pp. 649, with 450 line drawings and diagrams. Philadelphia: W. B. Saunders Company, 1938.

The author states that he wrote a book to introduce students to the study of diseases of the ear, nose and throat and to serve as a source of working knowledge to the practitioner in his daily rounds. I might add that there is much of practical value in it to all interested in otorhinolaryngology.

The book can be divided according to subject matter into three approximately equal sections: on the nose and the sinuses, with an excellent chapter on the role of allergy; on the pharynx, the larynx and associated structures (the trachea, bronchi and esophagus) and on the ear.

The masterful descriptive ability which the author from his broad experience brings to the subject matter and the 450 line drawings and diagrams which effectively illustrate the anatomy, pathology and technic are outstanding.

The section on the nose includes a discussion of the diseases of the external nose and the septum and of acute and chronic infections of the sinuses, which are singly and collectively considered. Physical examination is stressed. The diagrams of observations made during postnasal and nasopharyngoscopic examinations are noteworthy. A survey of the plastic procedures available for the correction of nasal deformities rounds out the chapter on the external nose, while the chapter on allergy, with its discussion of the formation of polyps and of hyperplastic sinusitis, brings the newer concepts in this field to the fore.

There is a similar masterful and up-to-date treatment of the diseases of, and the procedures used in dealing with, the pharynx, larynx and esophagus. Sulfanilamide treatment of streptococcic infections and surgical access to serious pharyngomaxillary infections are discussed.

The last third of the book deals with the ear, stressing the anatomy, the technic of otoscopy, functional examination and the elicitation of the semicircular canal phenomena. Both acute and chronic infections of the ear, as well as the nonsuppurative diseases, such as obstruction of the eustachian tube, Ménière's disease and otosclerosis, are adequately treated. Of particular interest are the formulary and the helpful index of symptoms.

HENRY A. MILLER, Philadelphia.